

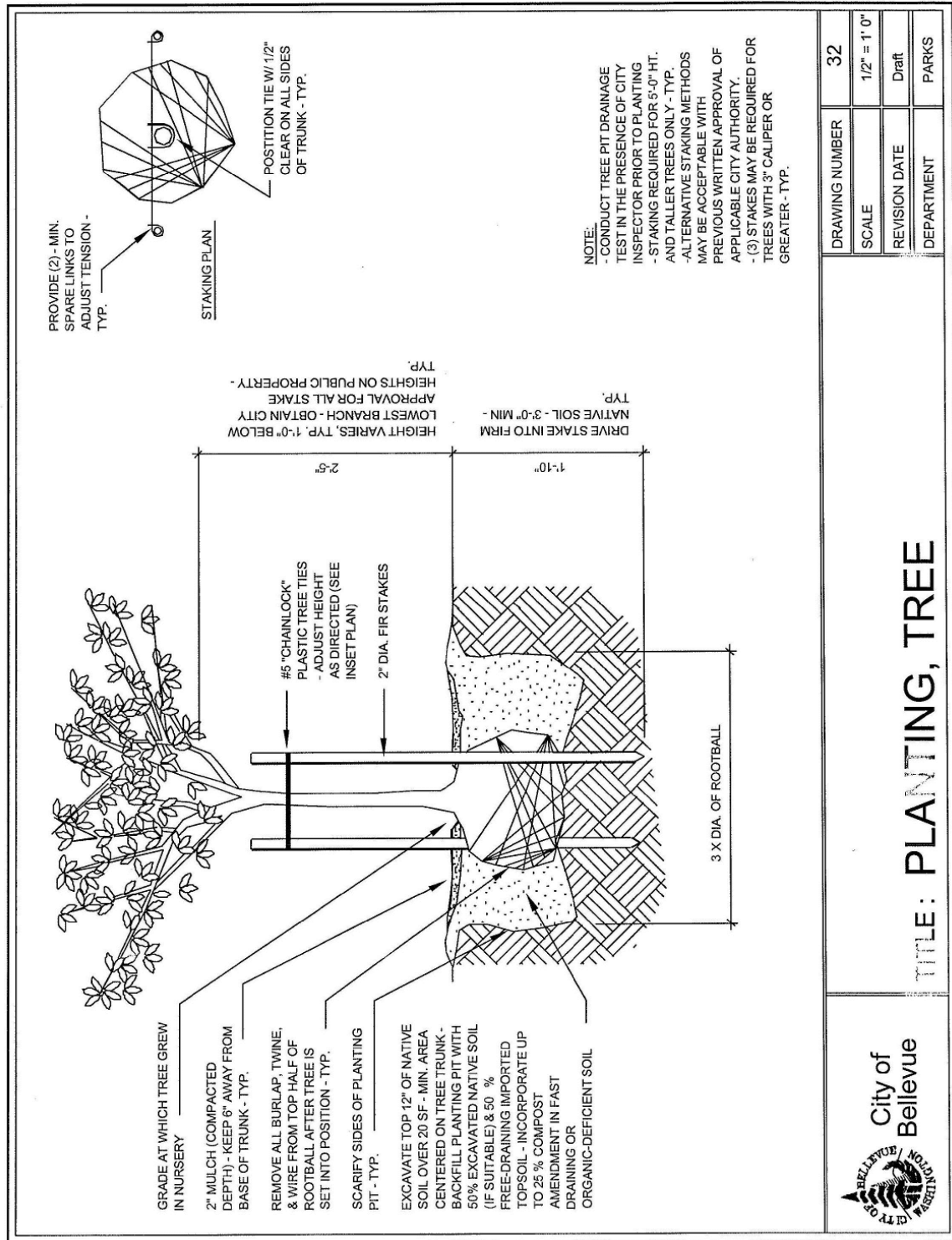
# References

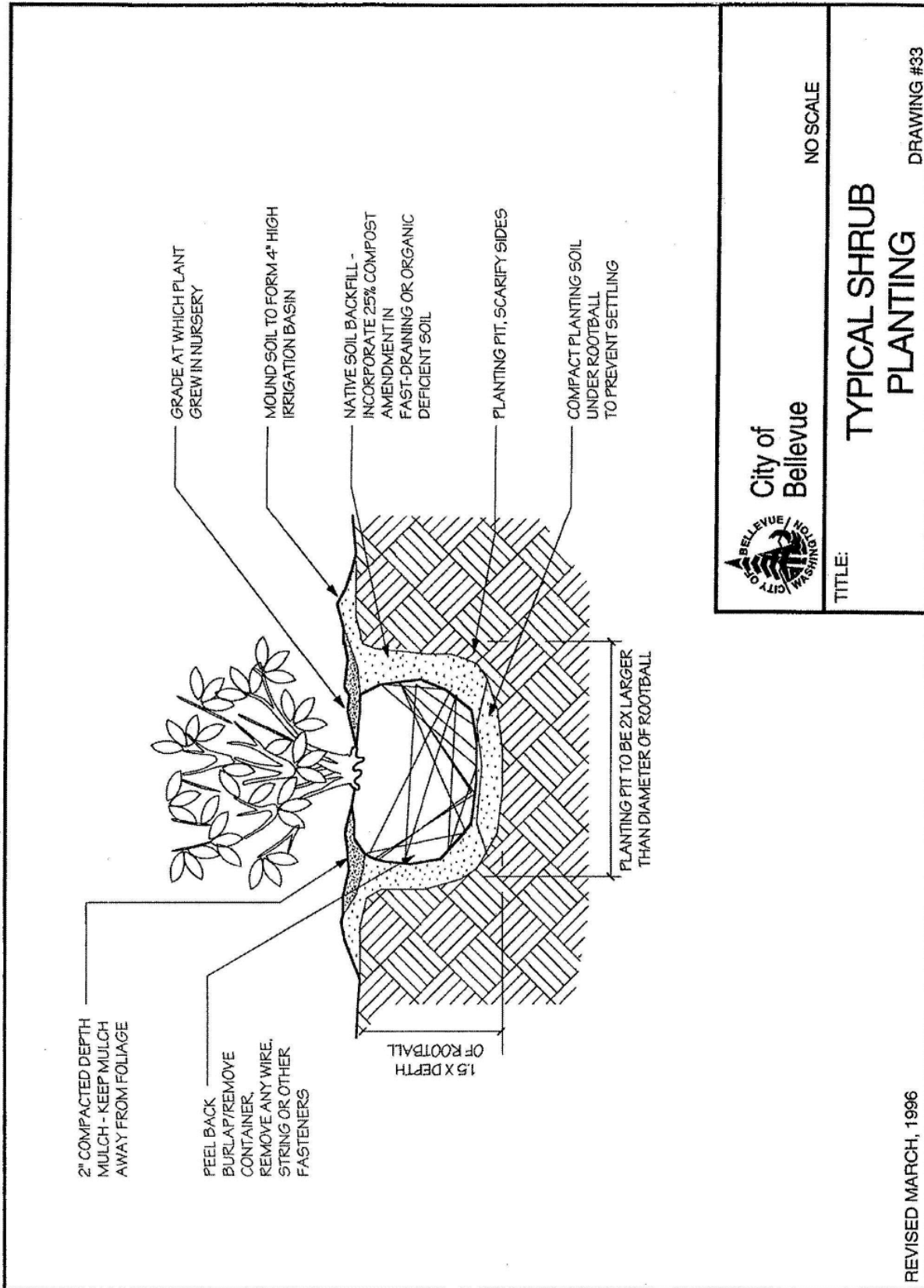
Some of the information found in this manual has been based on materials extracted from the following sources:

- American Association of Nurserymen (AAN) - 206-789-2900
- Society of American Foresters (SAF) - [www.safnet.org](http://www.safnet.org)
- American Society of Landscape Architects (ASLA) - [www.asla.org](http://www.asla.org)
- Irrigation Association (IA) - [www.irrigation.org](http://www.irrigation.org)
- National Arbor Day Foundation (NAF) - [www.arborday.org](http://www.arborday.org)
- Washington Department of Ecology (WDOE) - [www.ecy.wa.gov](http://www.ecy.wa.gov)
- Washington Food and Drug Administration (WFDA) - [www.fda.gov](http://www.fda.gov)
- Washington Department of Fish and Wildlife (WFW) - [wdfw.wa.gov](http://wdfw.wa.gov)
- Washington State Department of Natural Resources (WDNR) - [www.dnr.wa.gov](http://www.dnr.wa.gov)
- Environmental Protection Agency (EPA) - [www.epa.gov](http://www.epa.gov)
- National Recreation and Park Association (NRPA) - [www.nrpa.org](http://www.nrpa.org)
- City of Seattle, Department of Parks & Recreation - [www.ci.seattle.wa.us/parks](http://www.ci.seattle.wa.us/parks)

For any additional information, contact the above websites.

# Design Standard Detail Drawings





REVISED MARCH, 1996



City of  
Bellevue

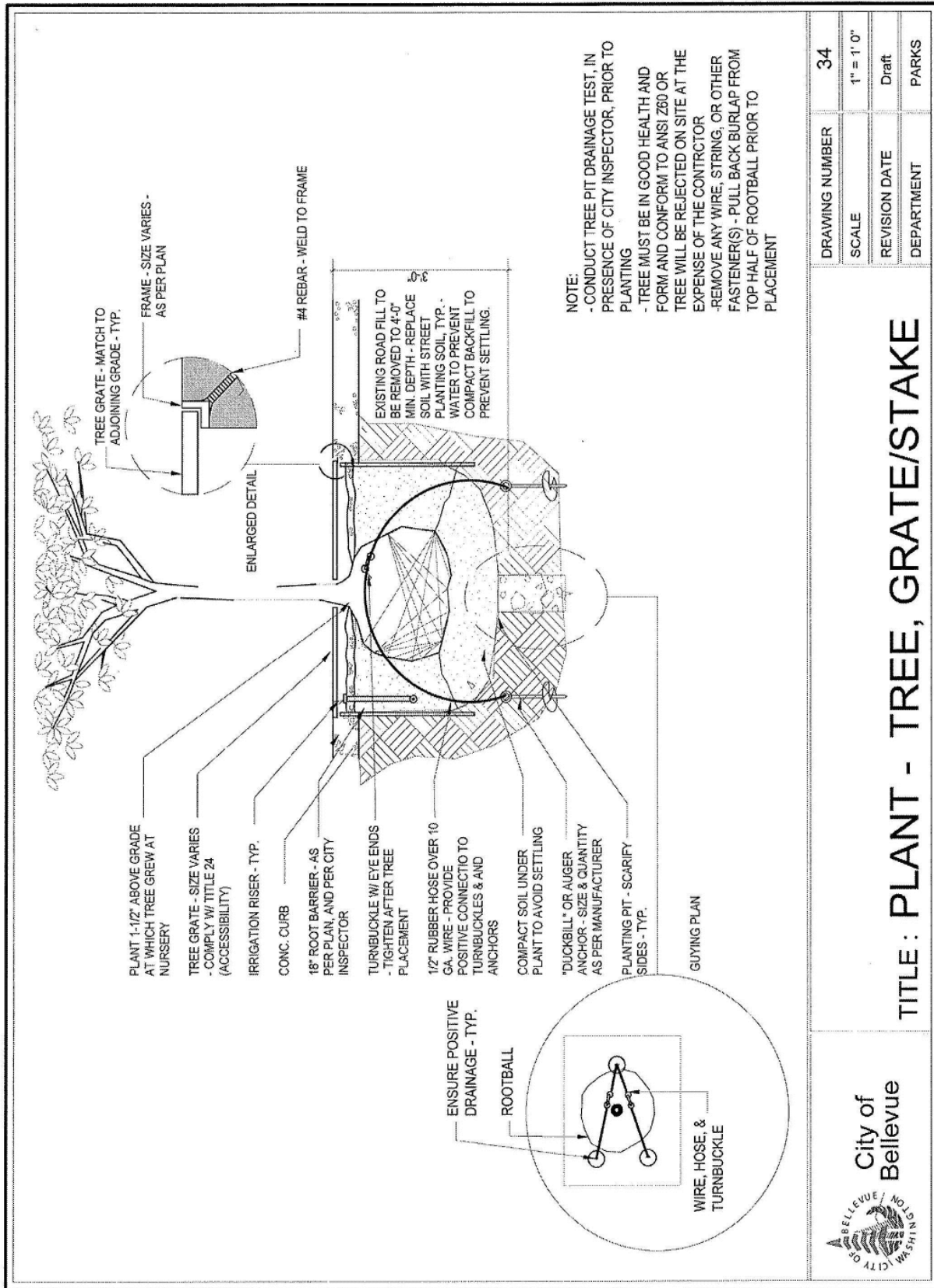
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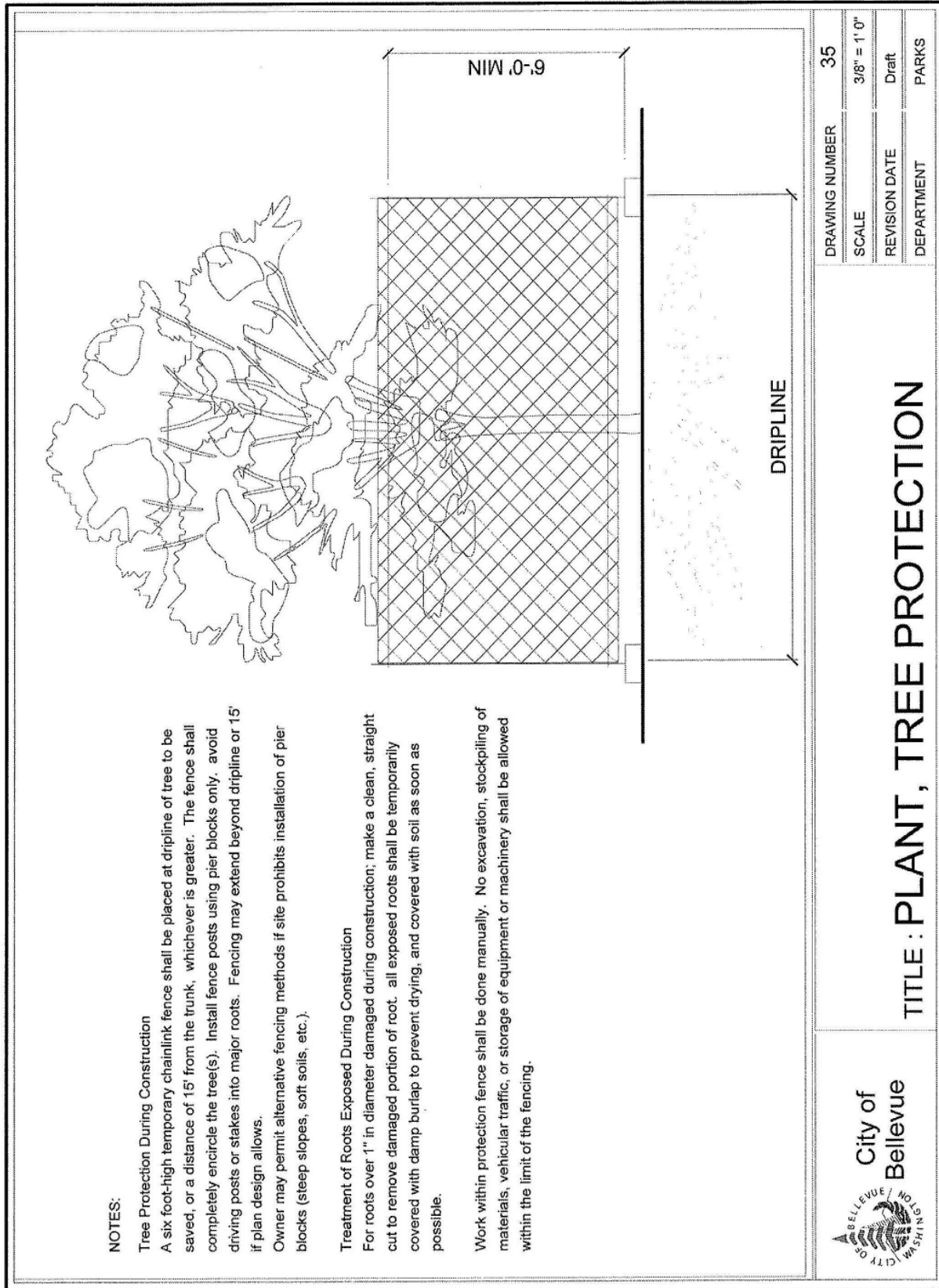
# TYPICAL SHRUB PLANTING

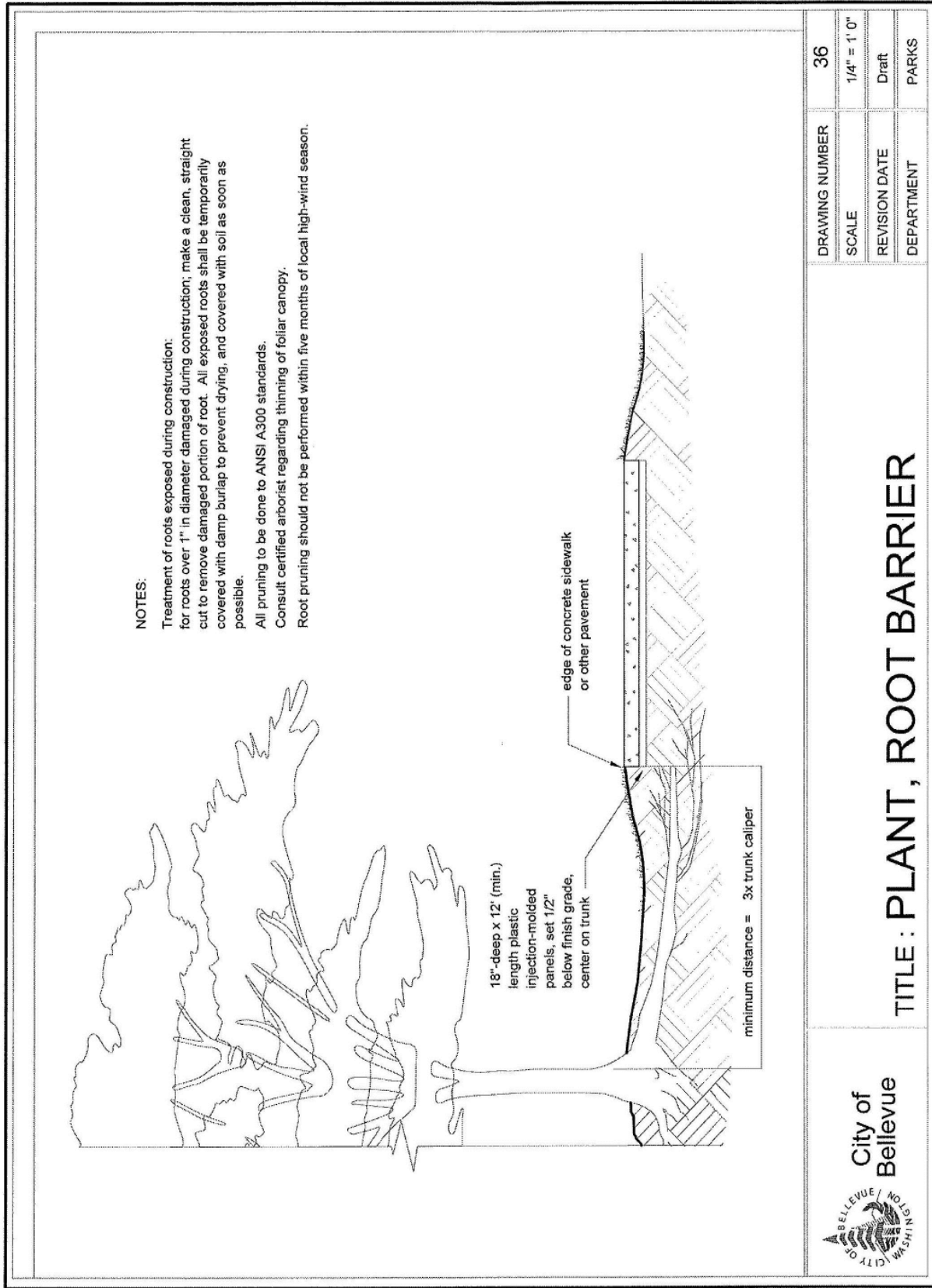
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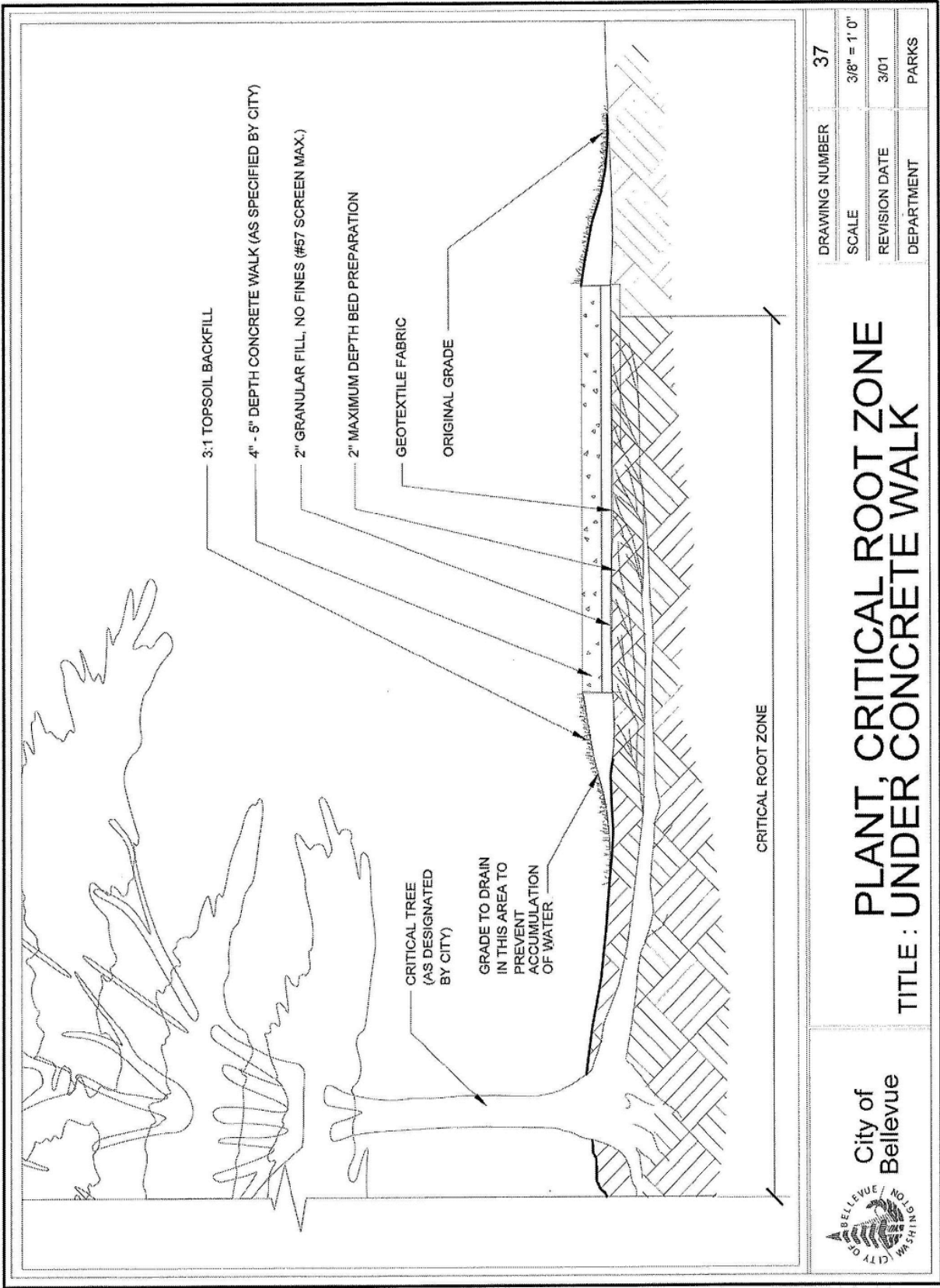




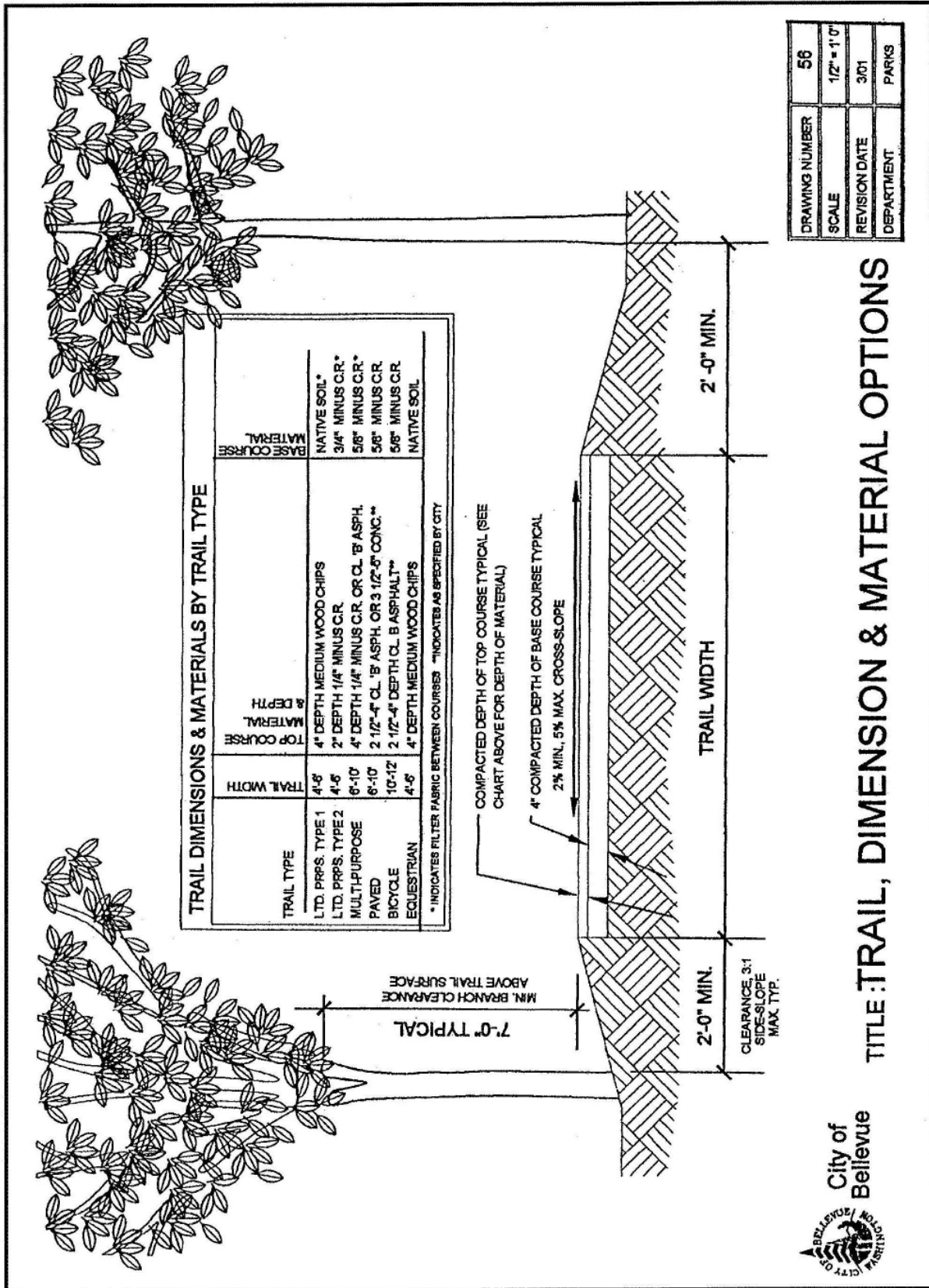




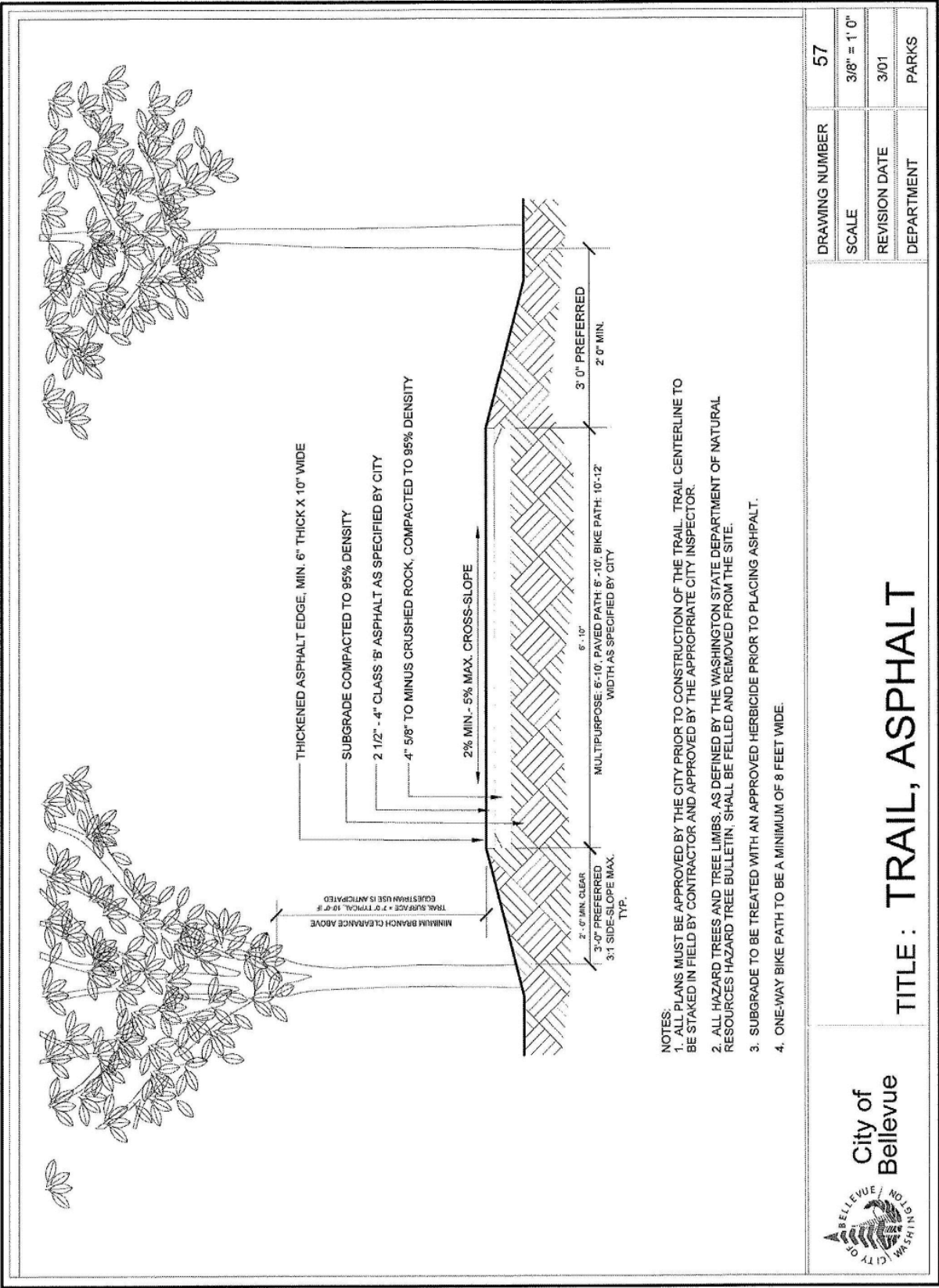


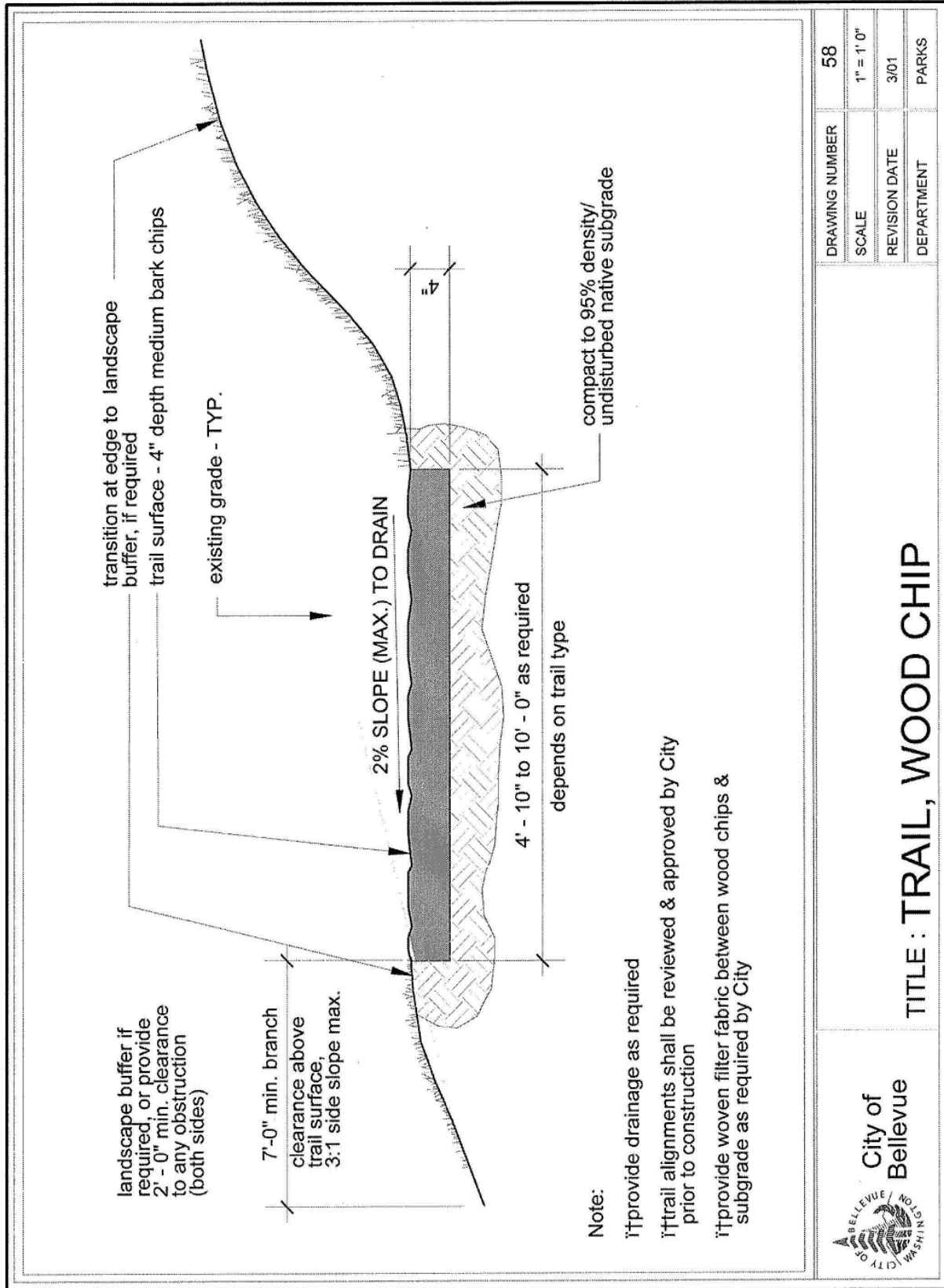


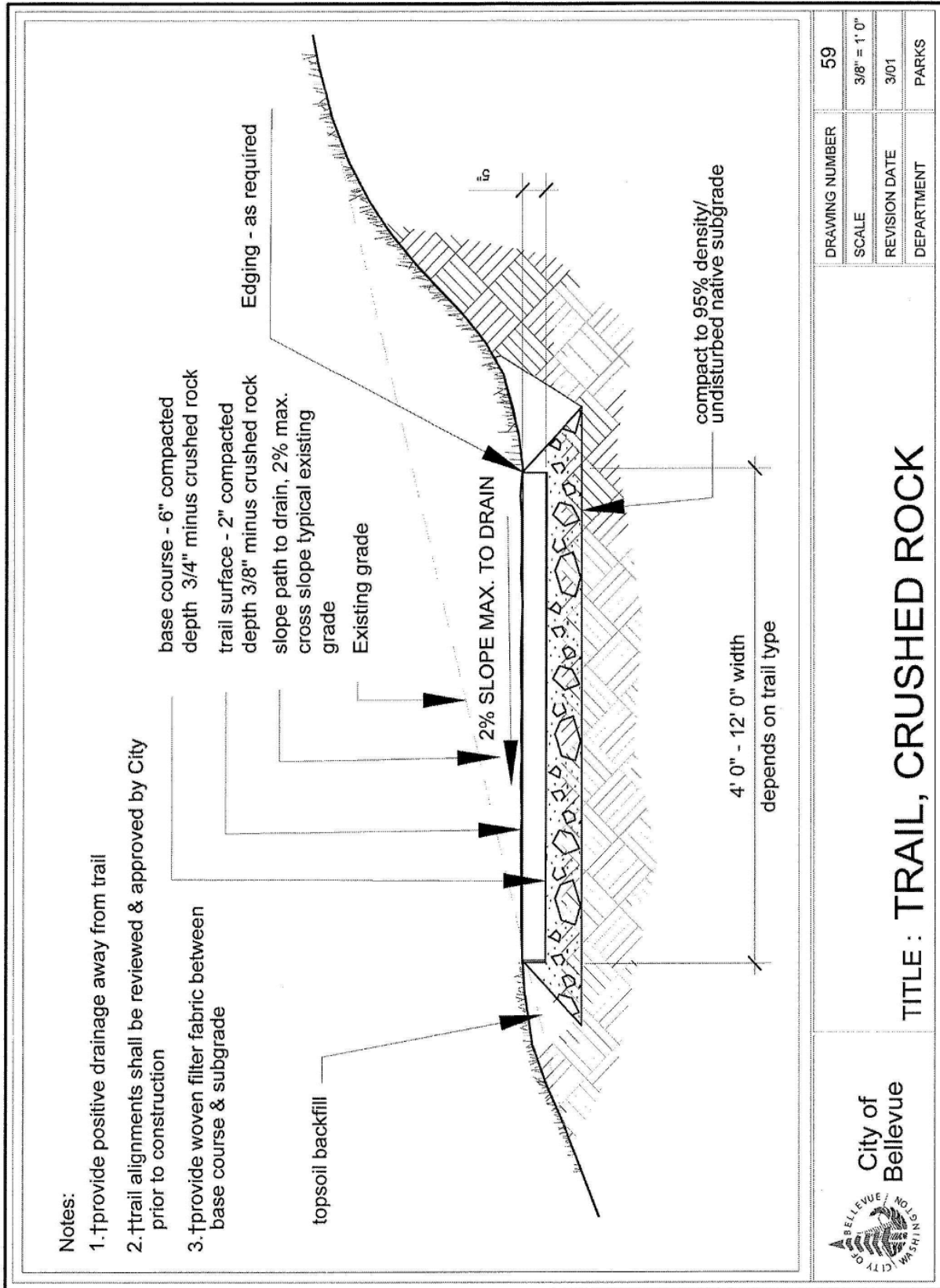




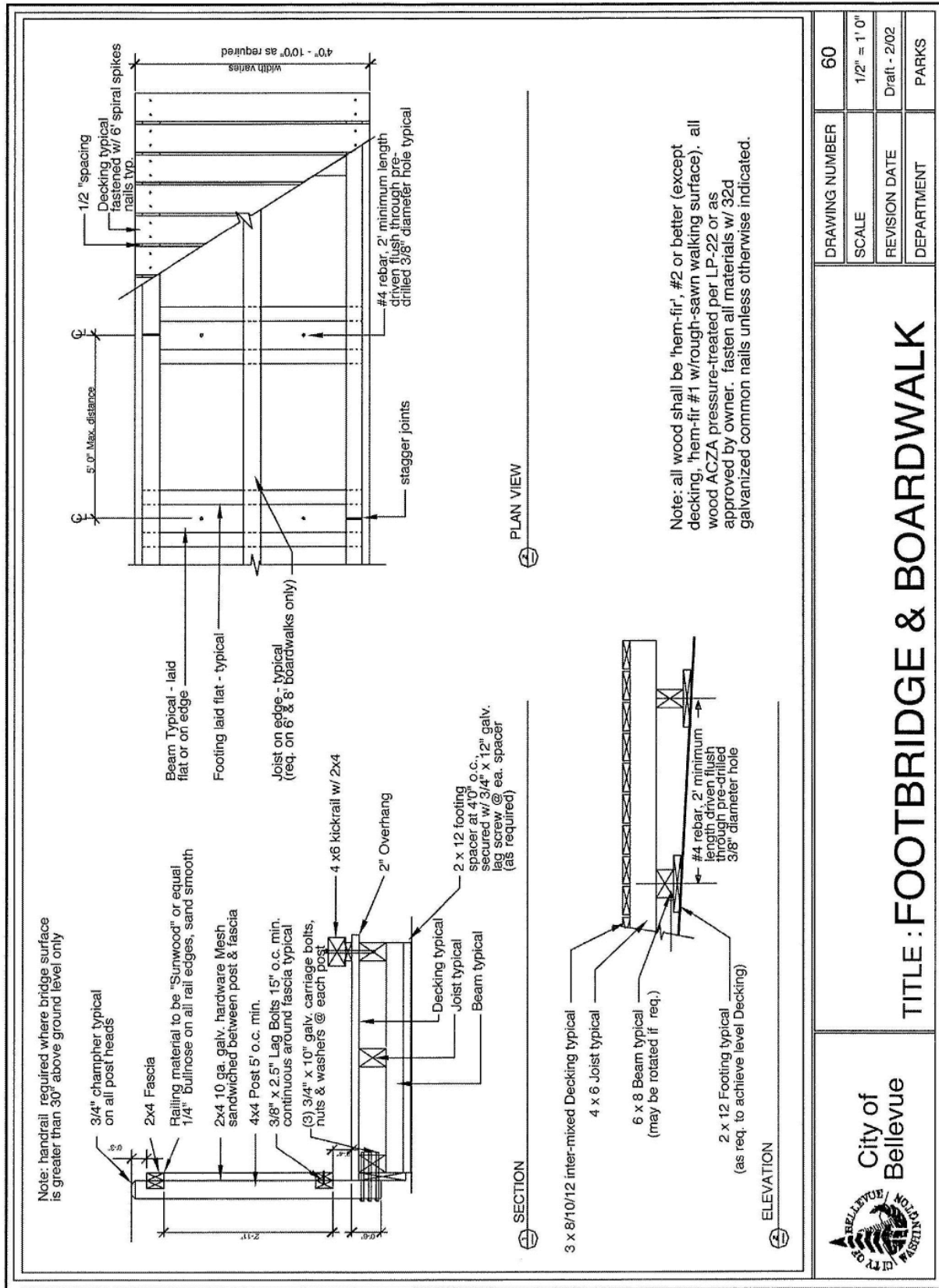




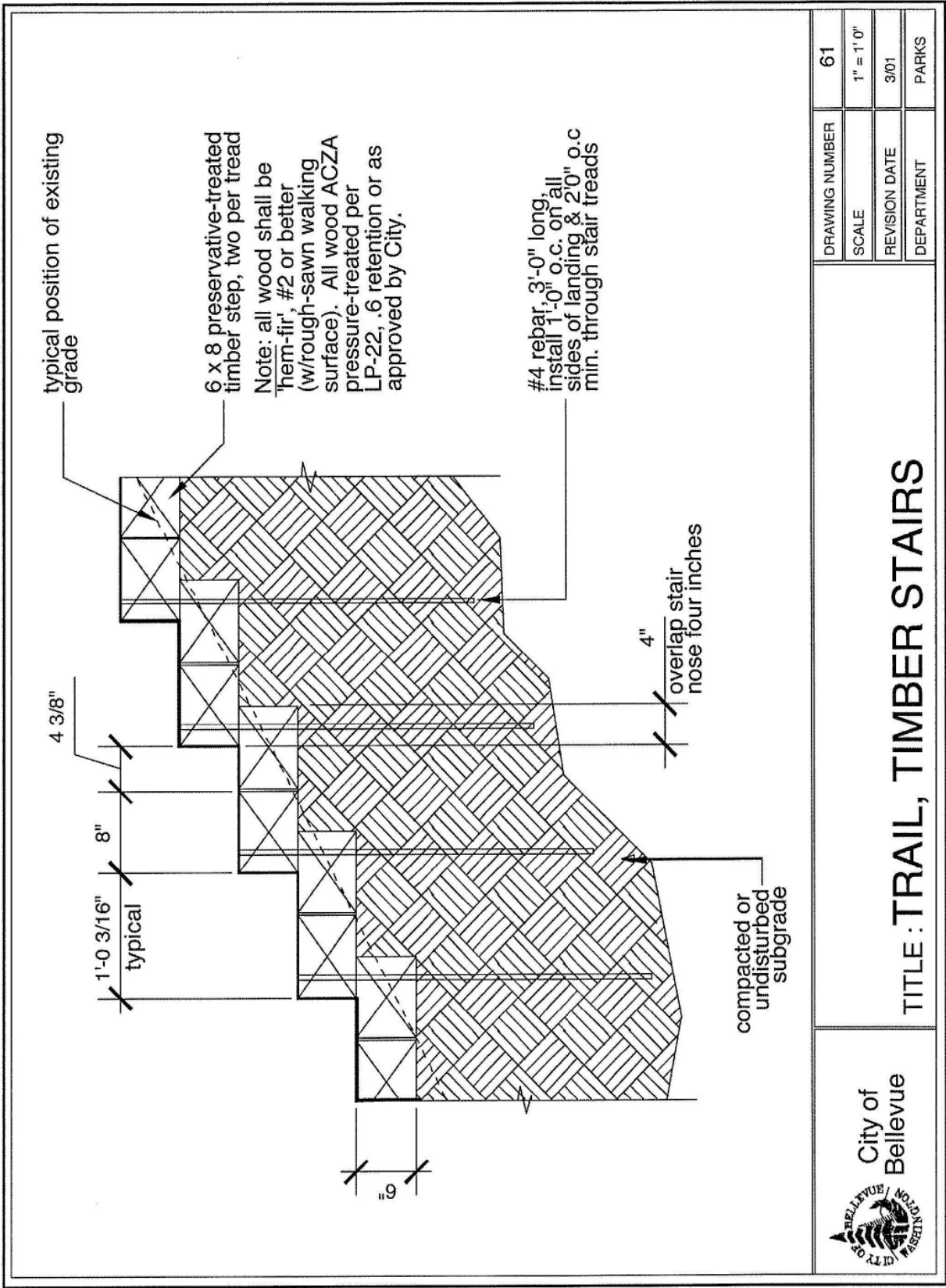


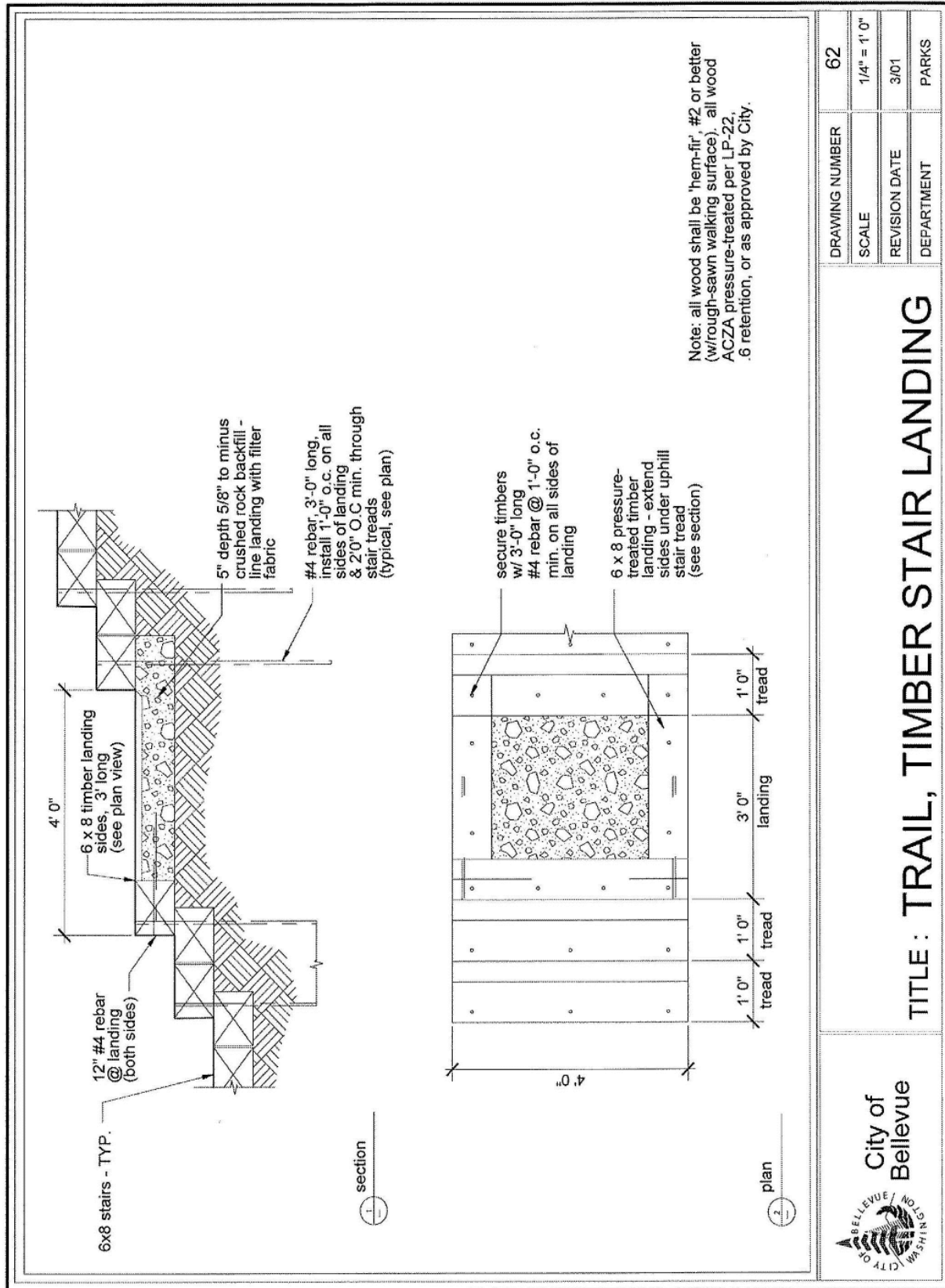


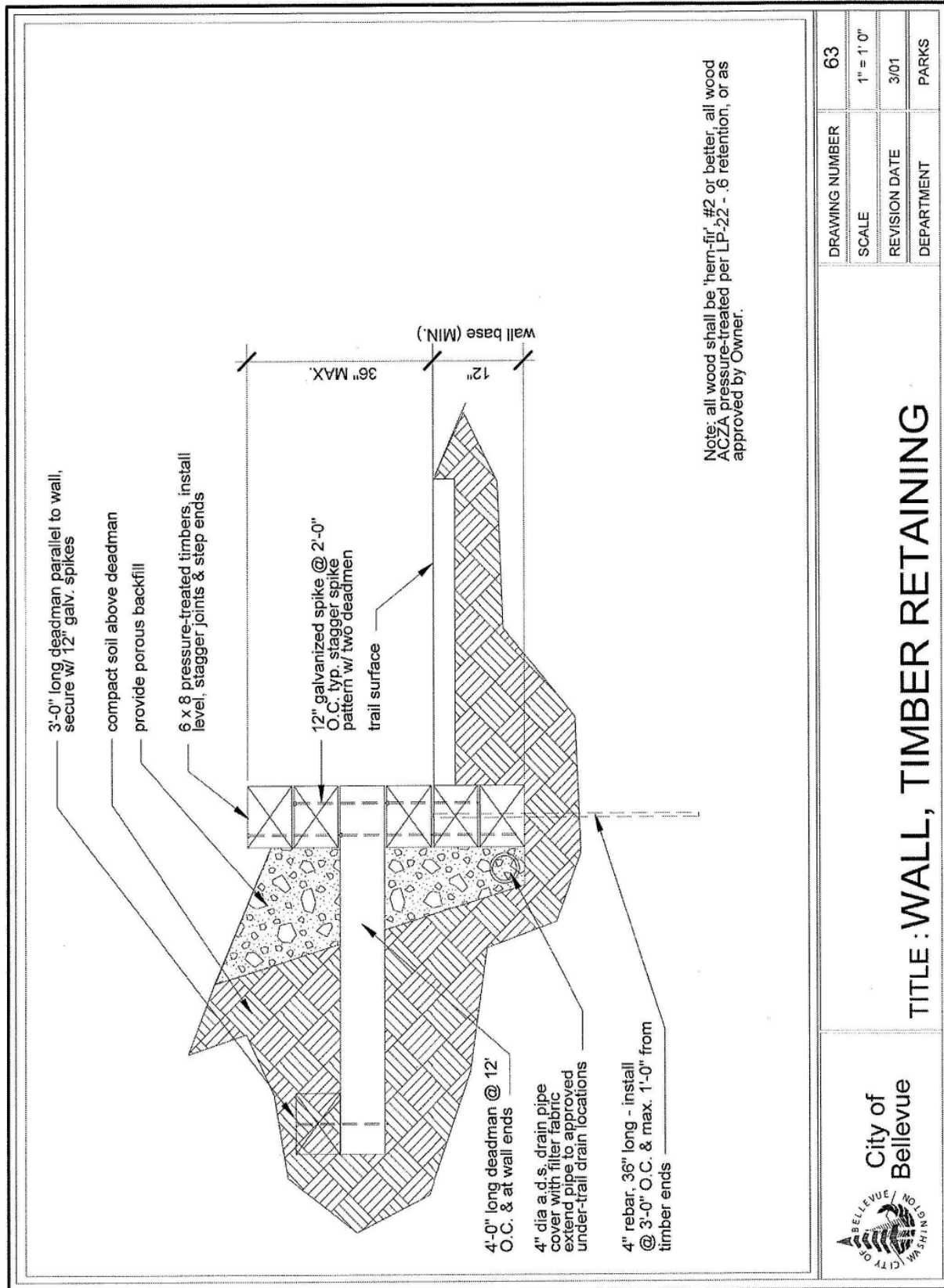




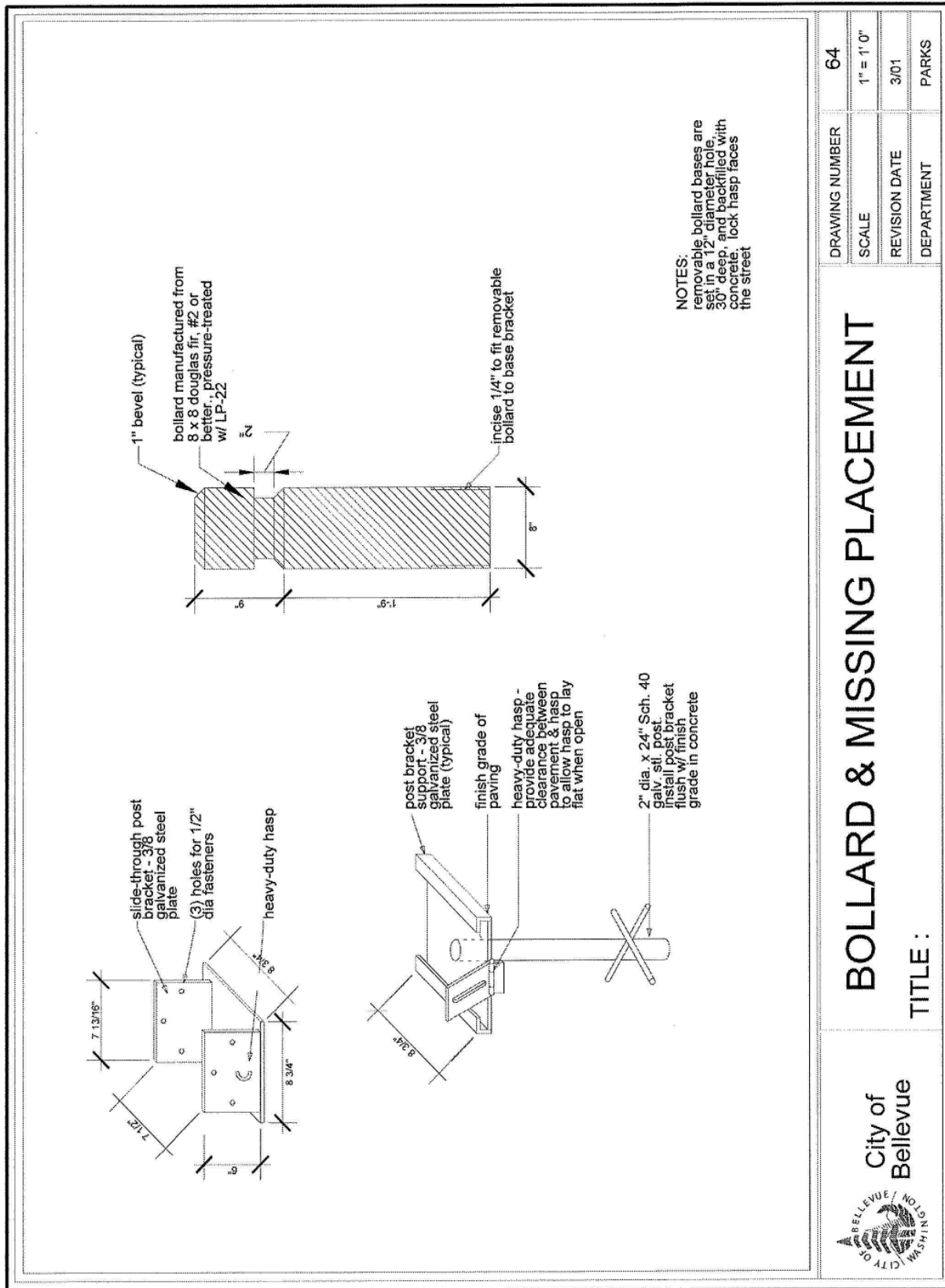




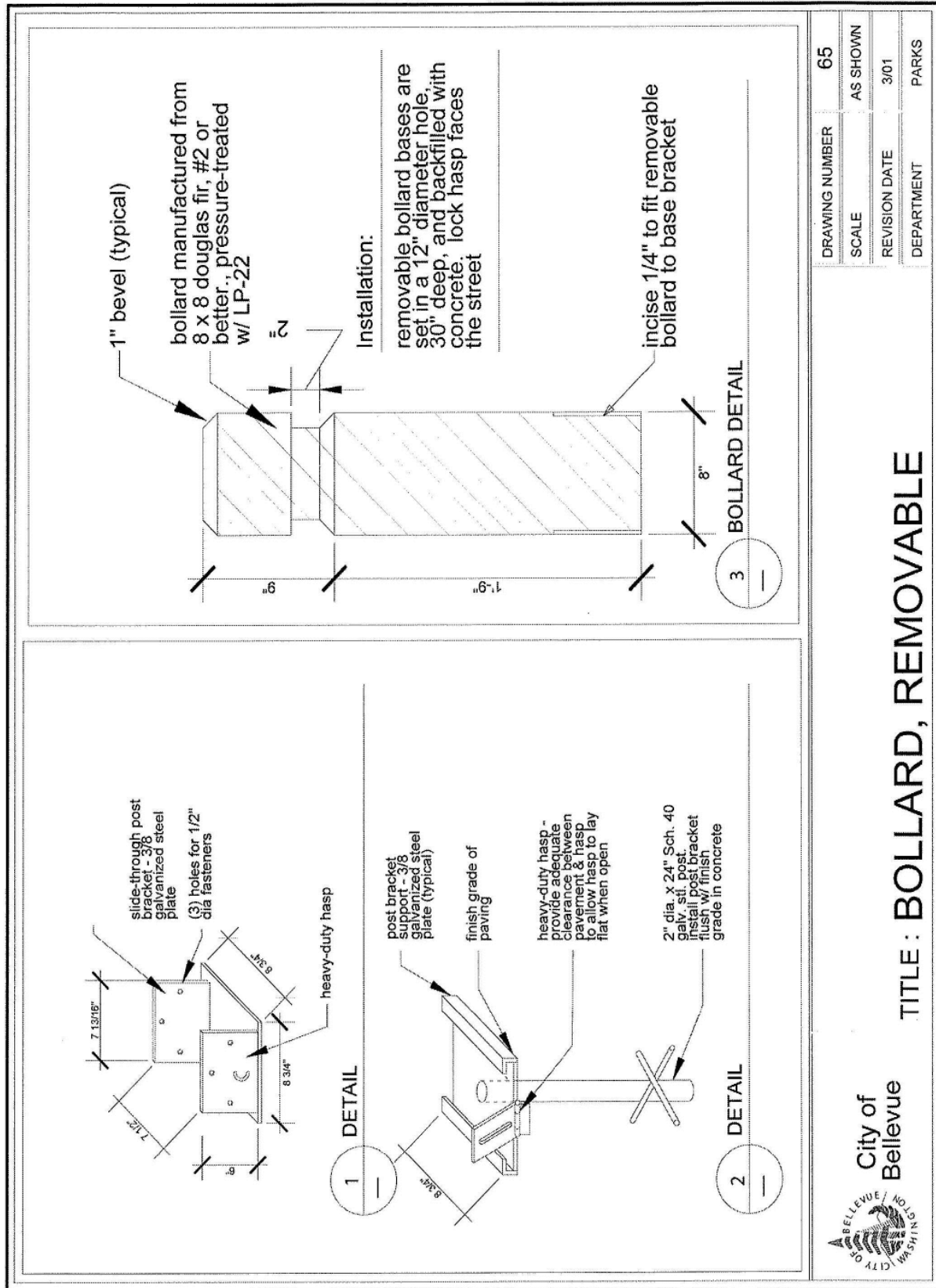


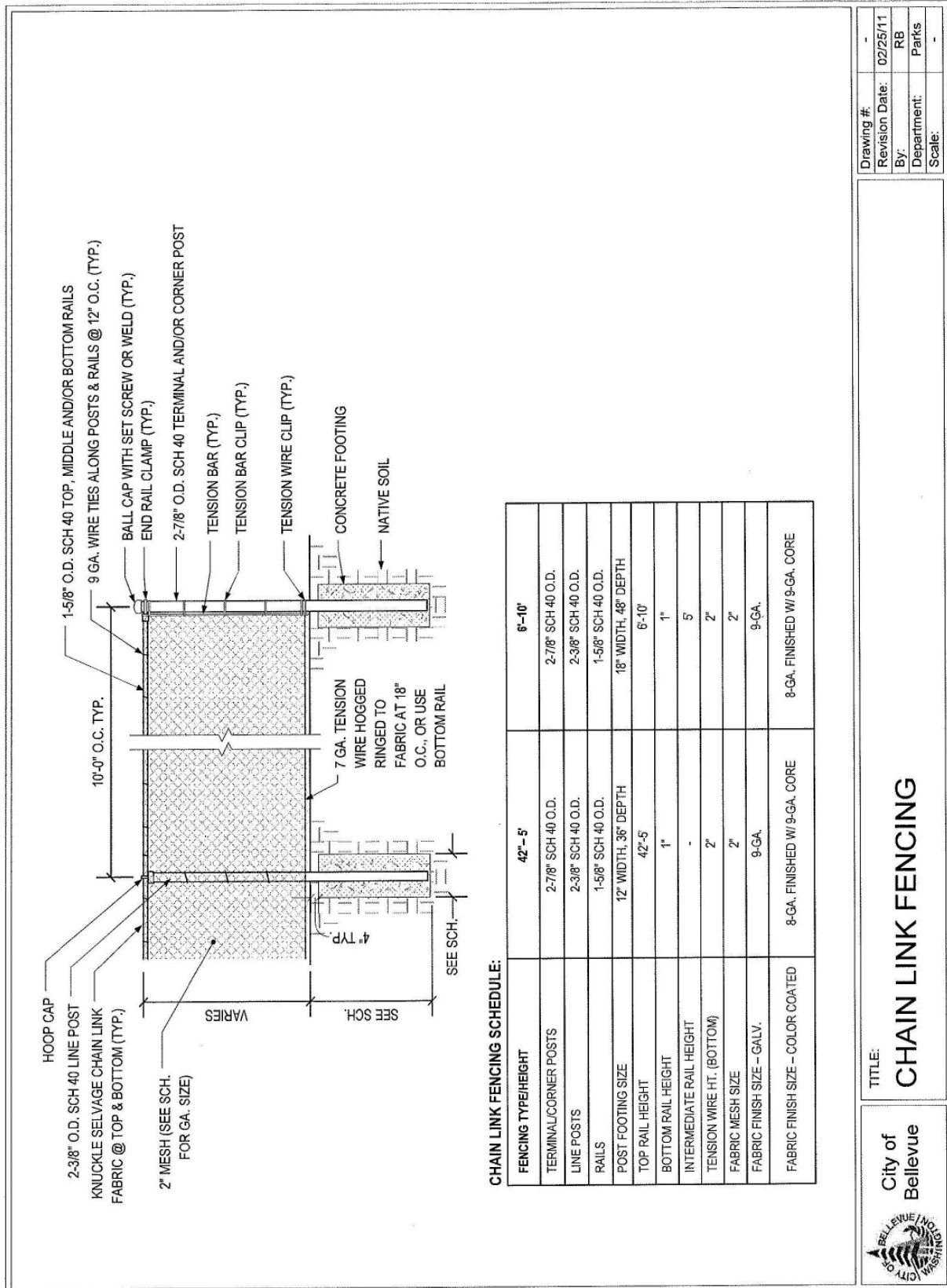


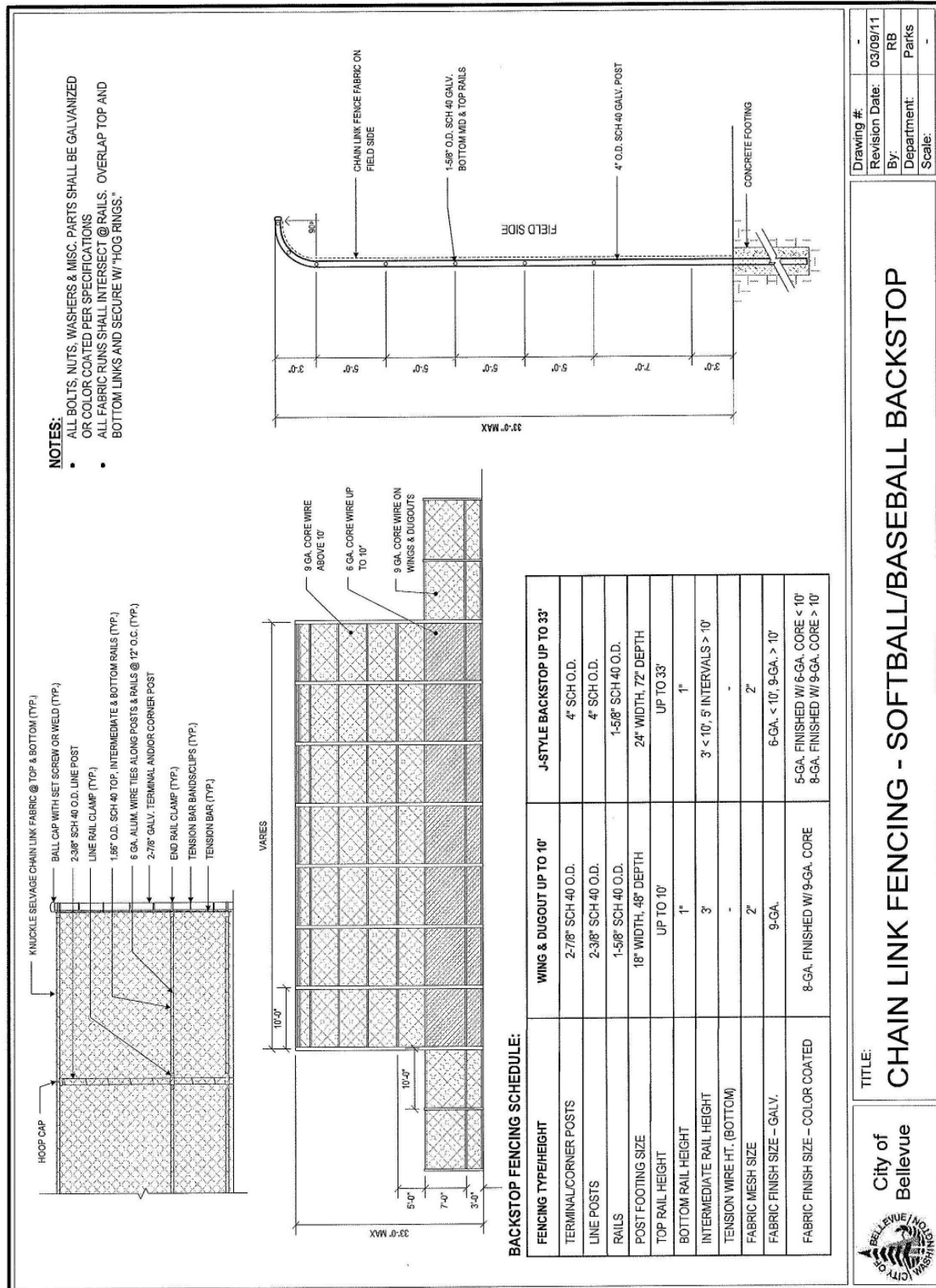




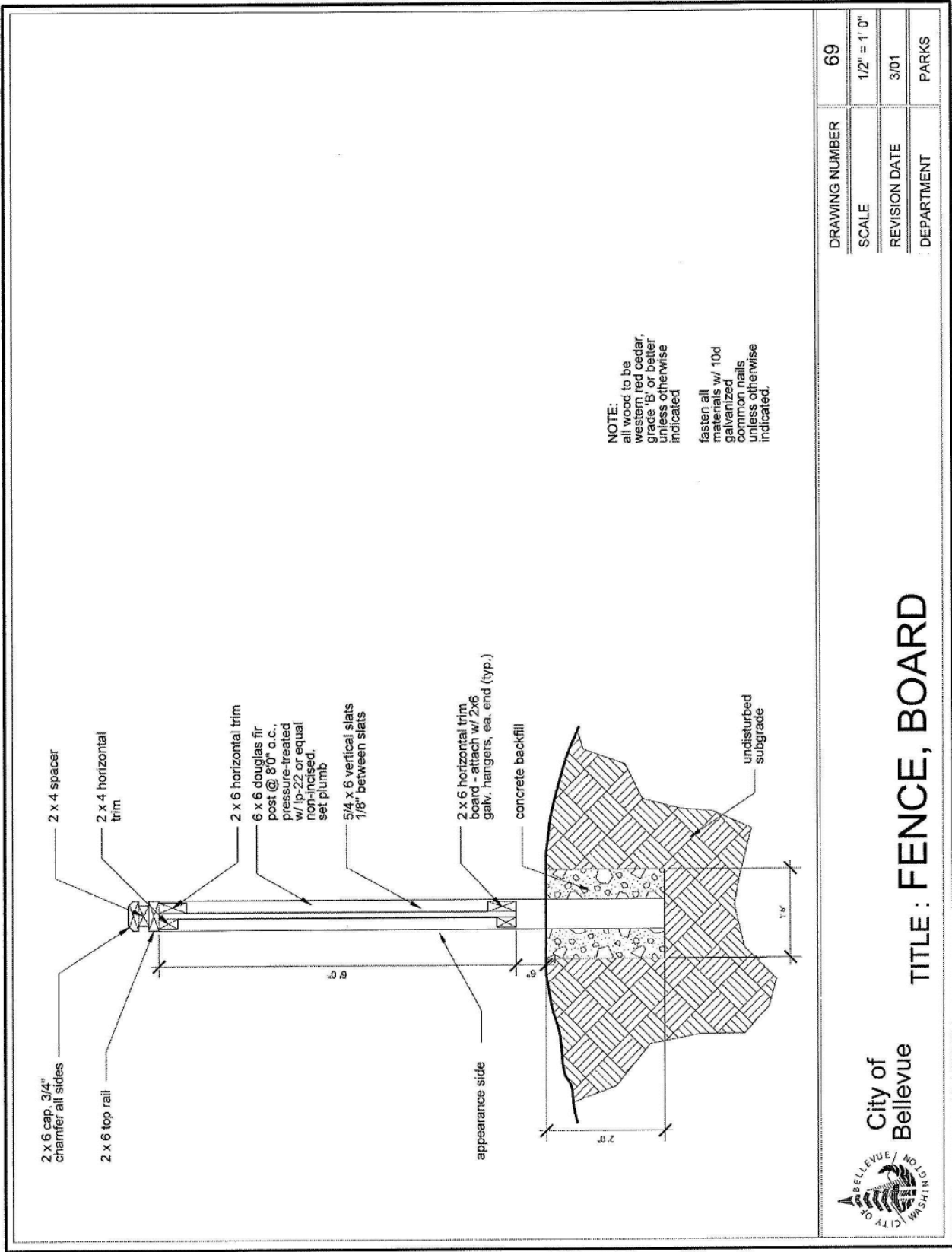




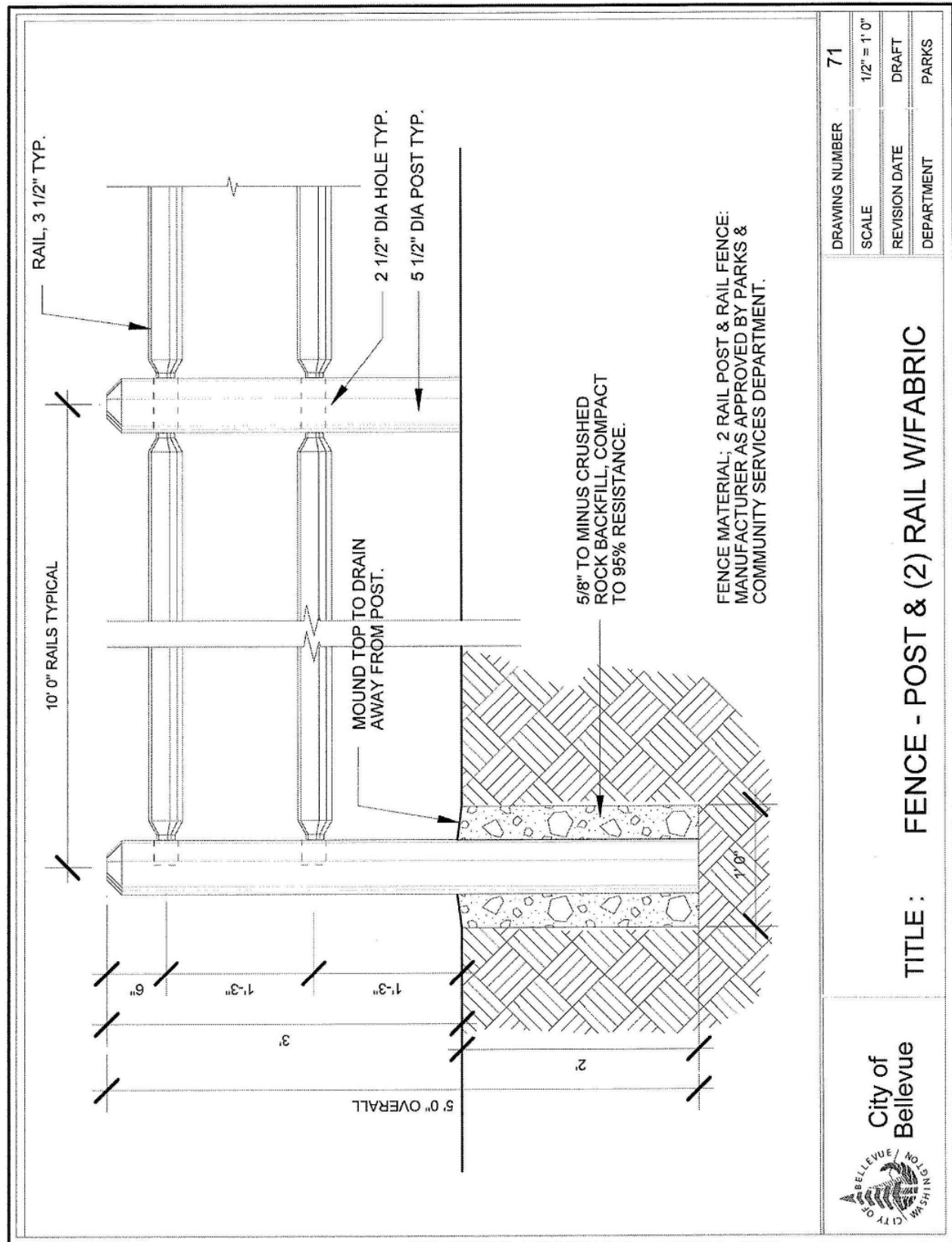


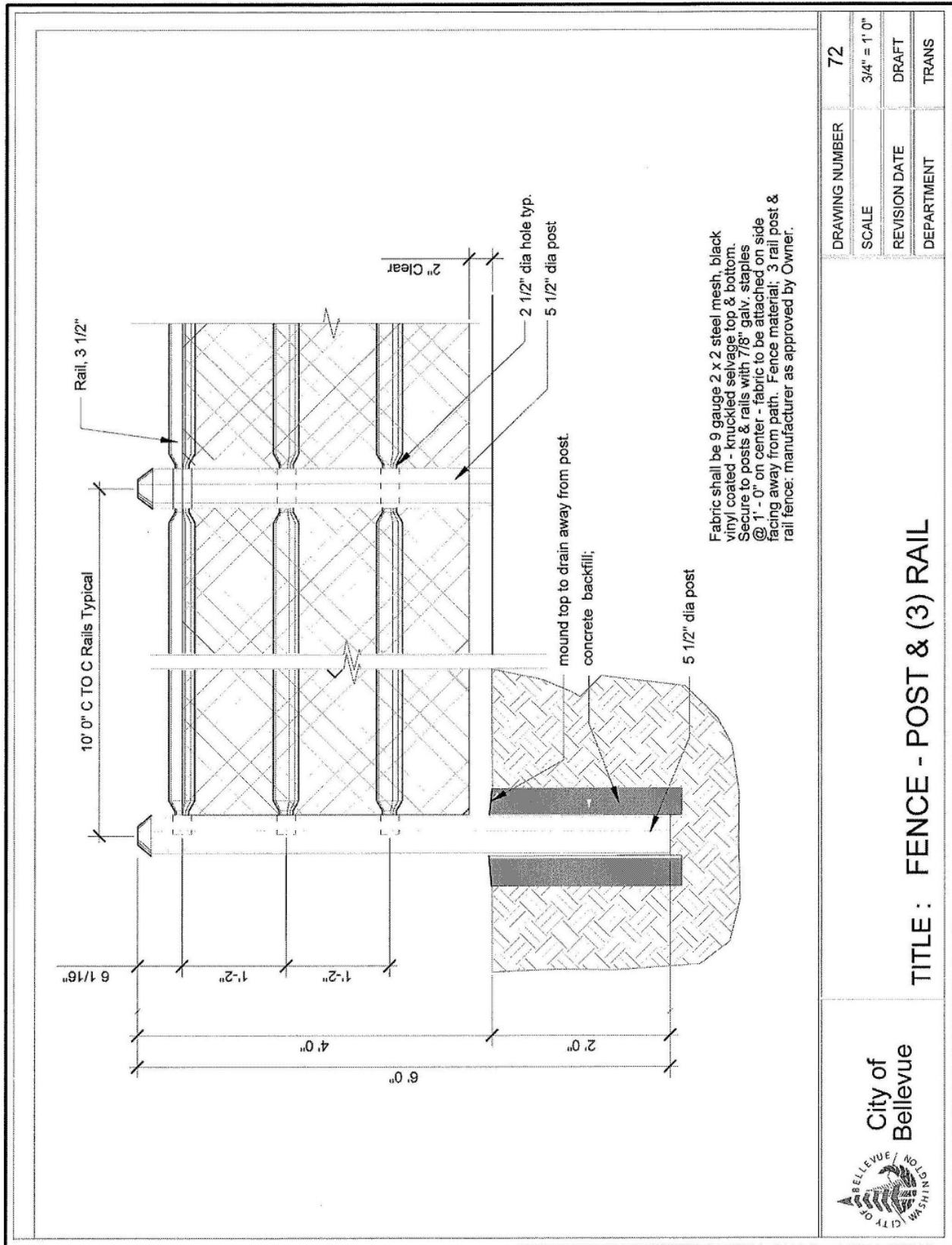


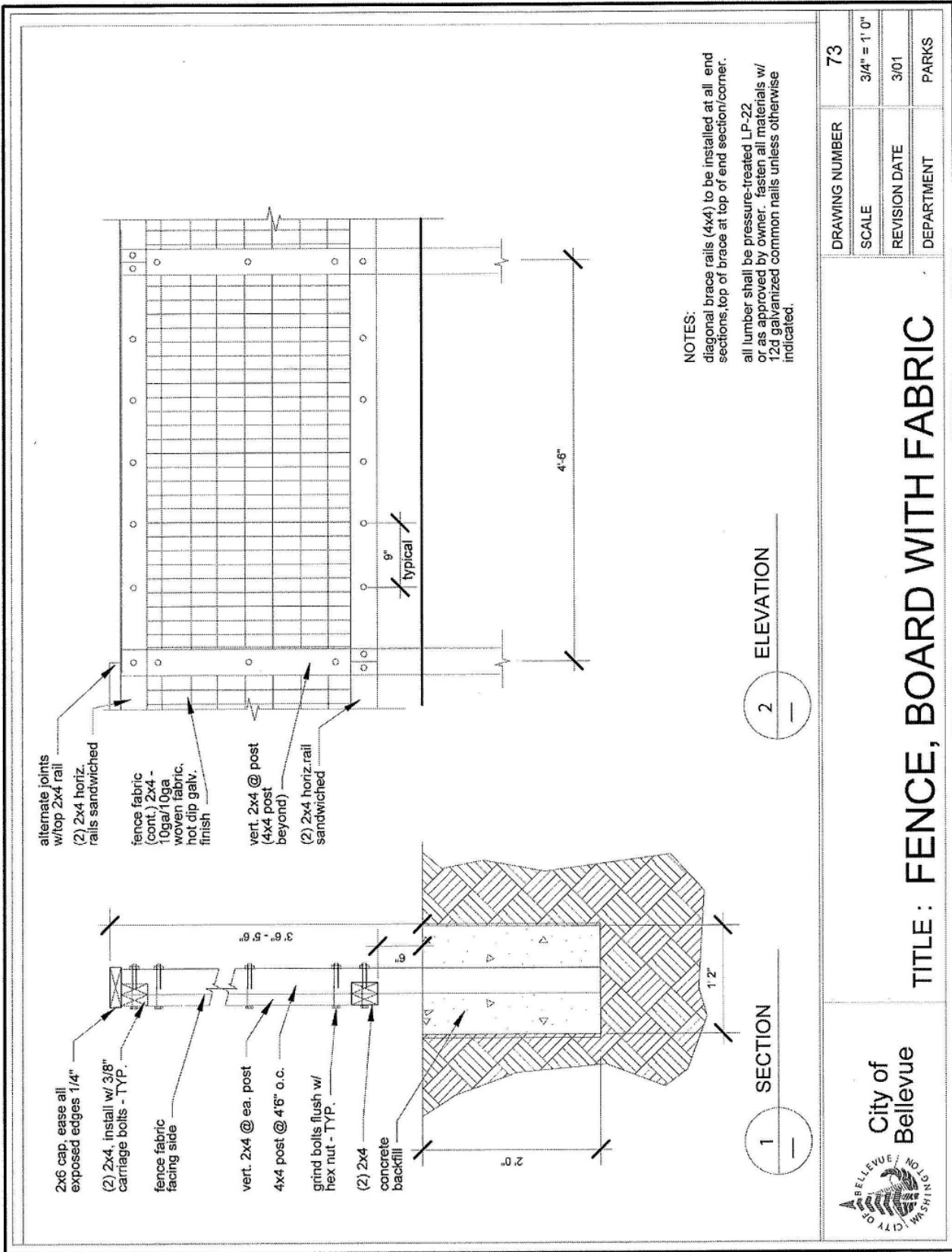




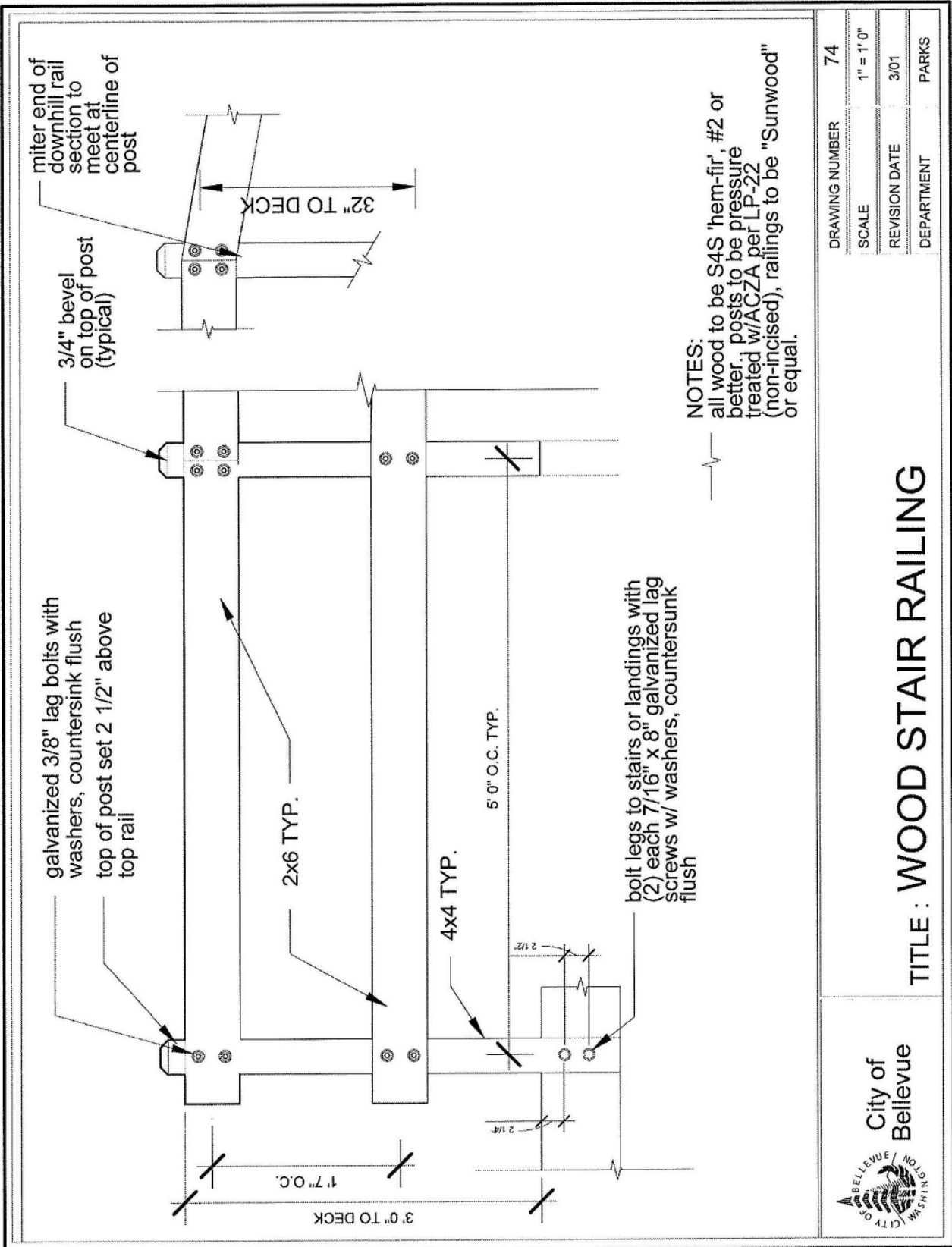


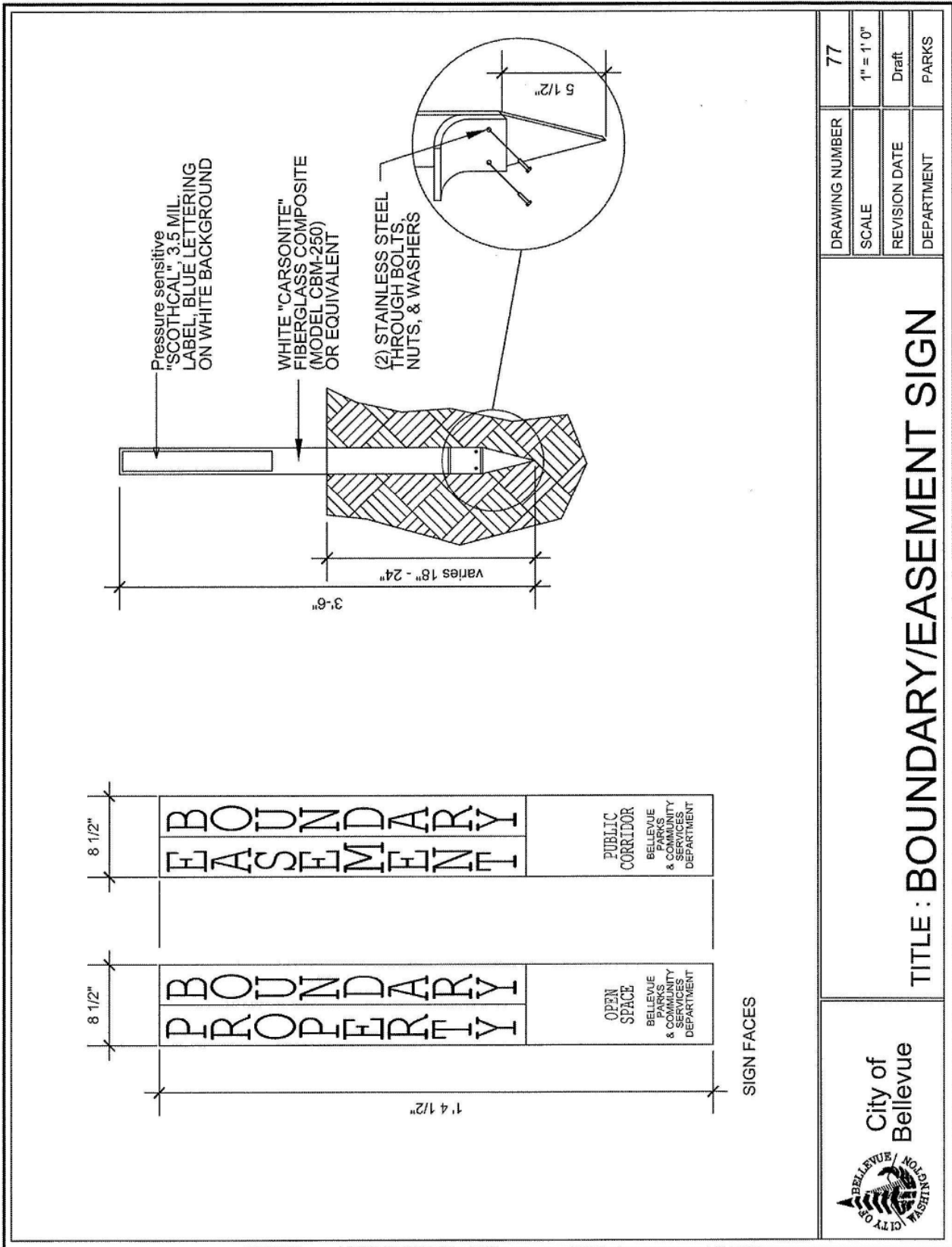


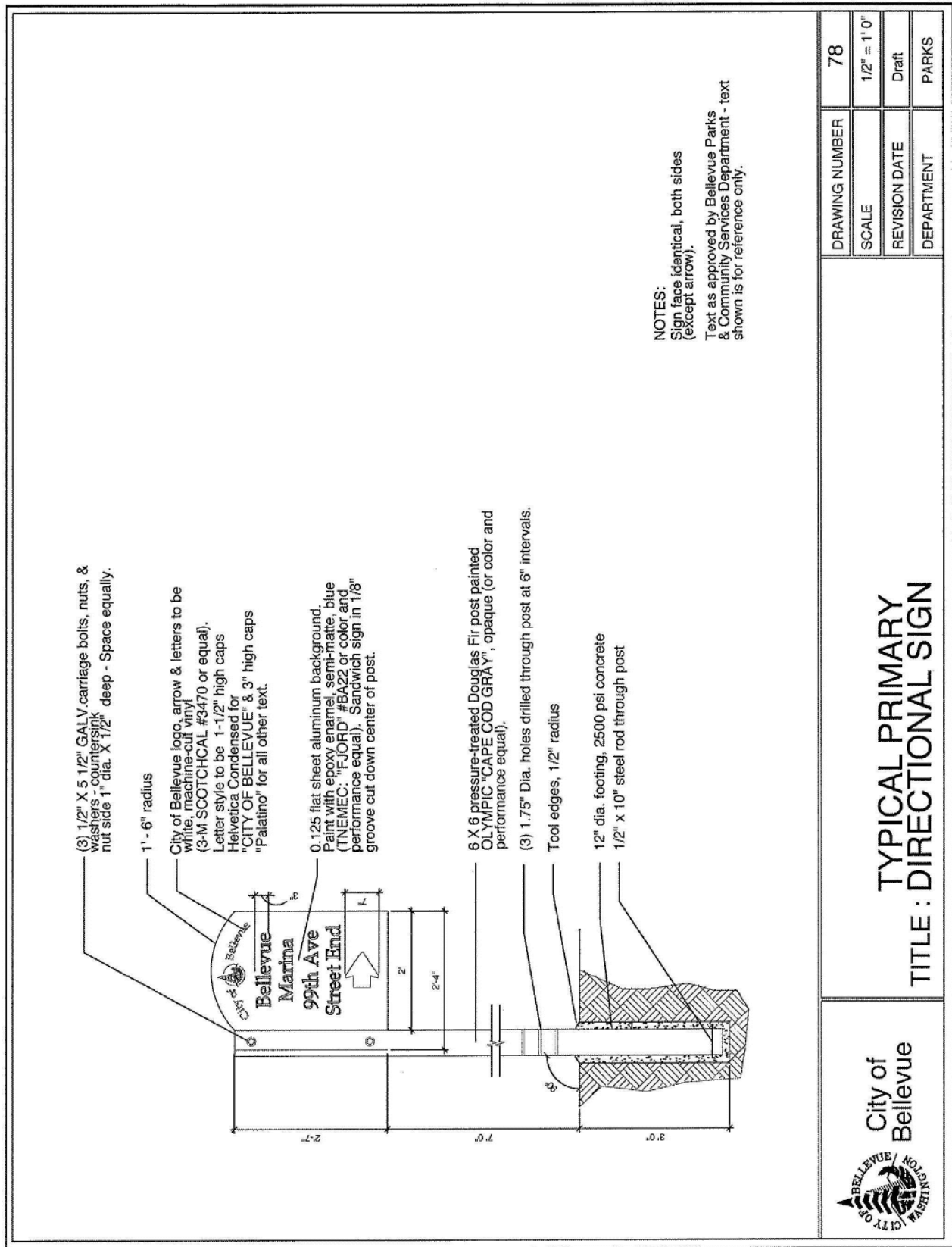




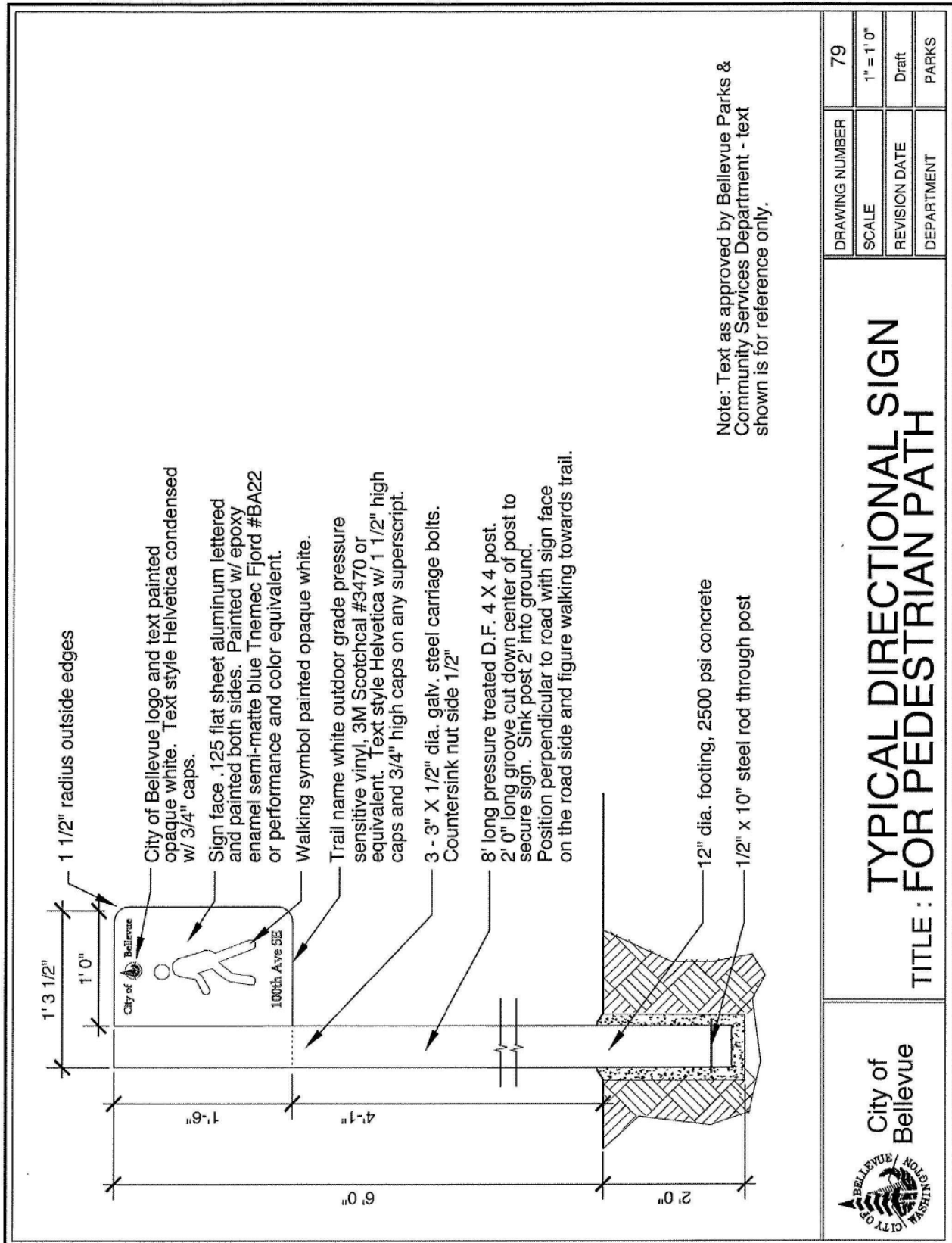


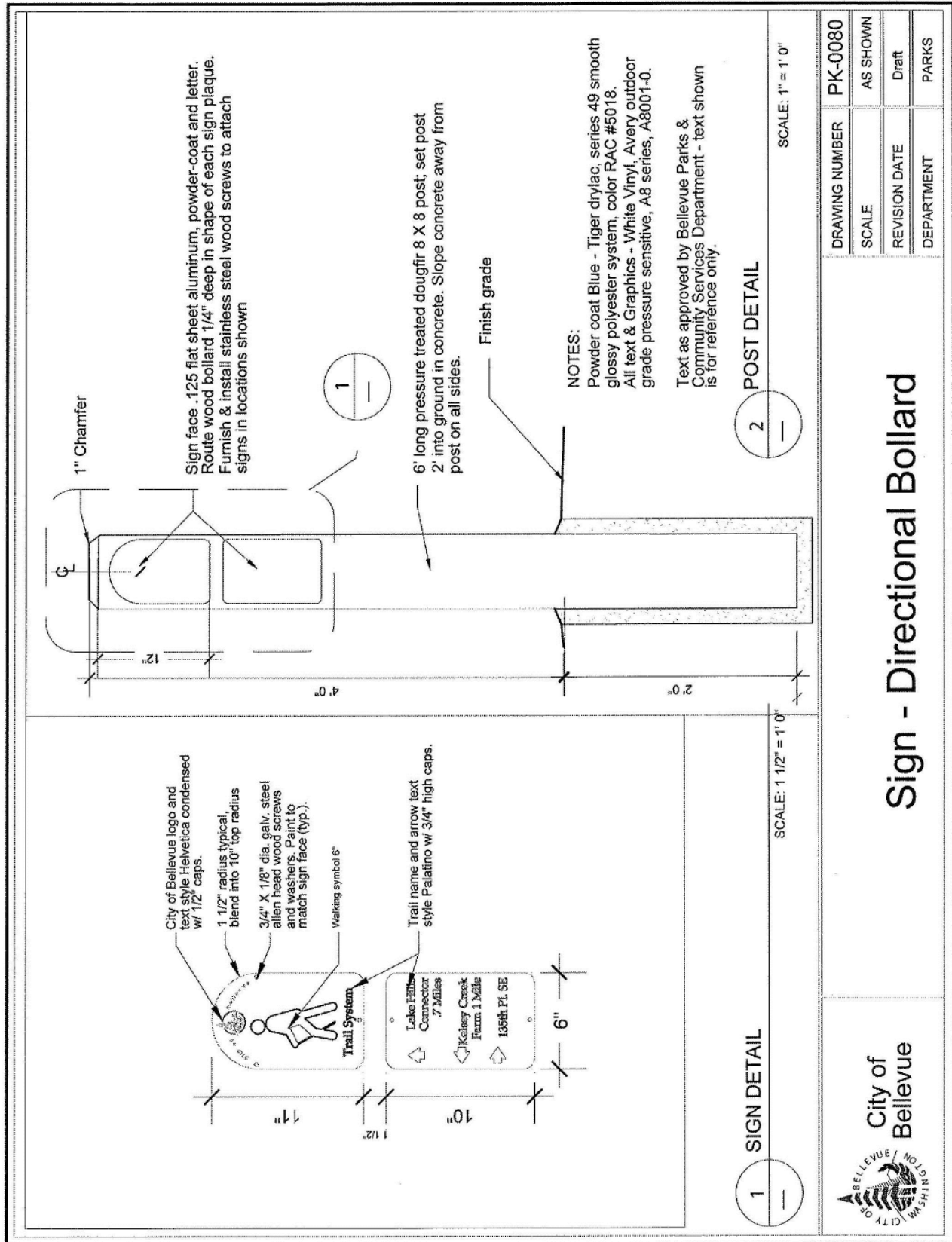


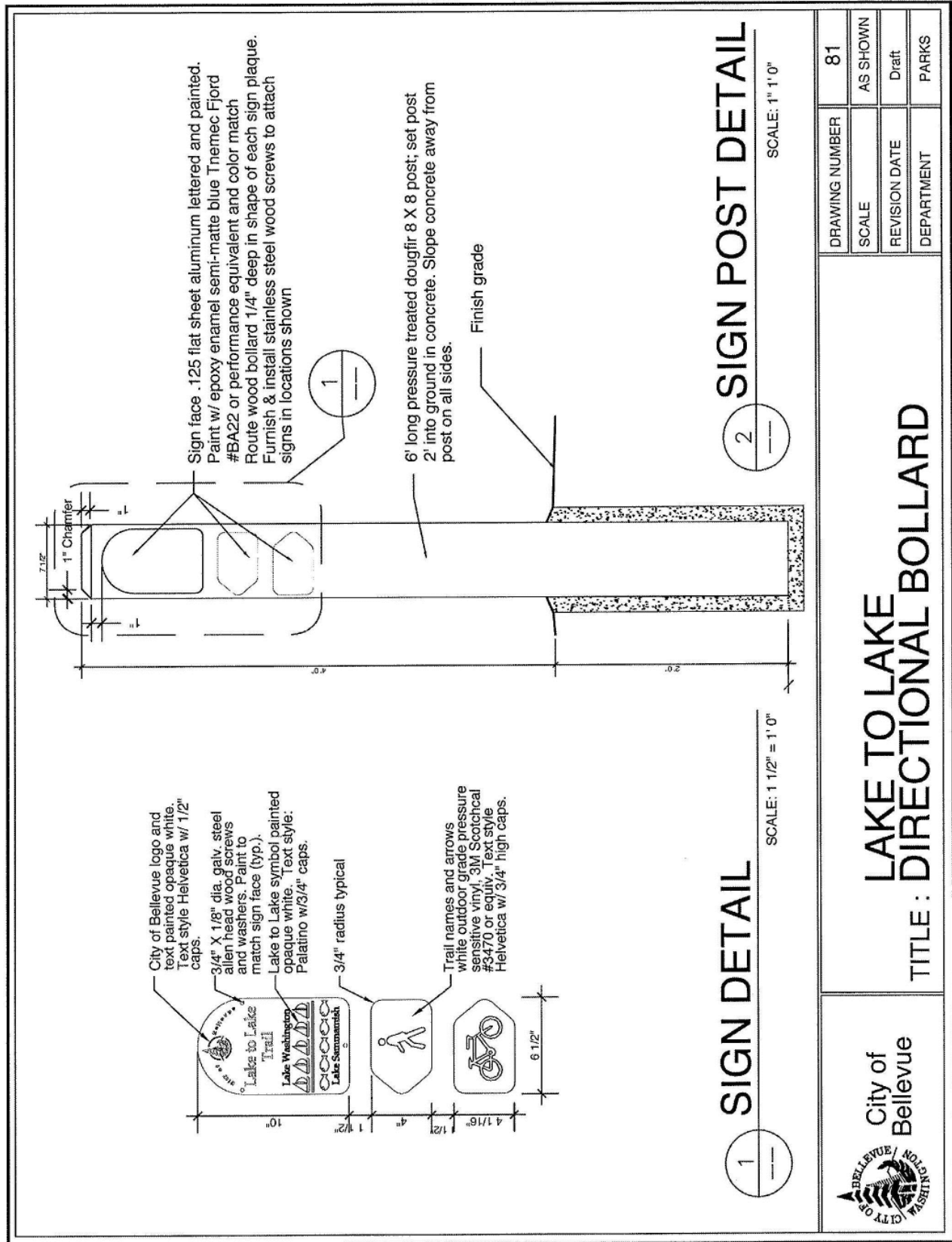




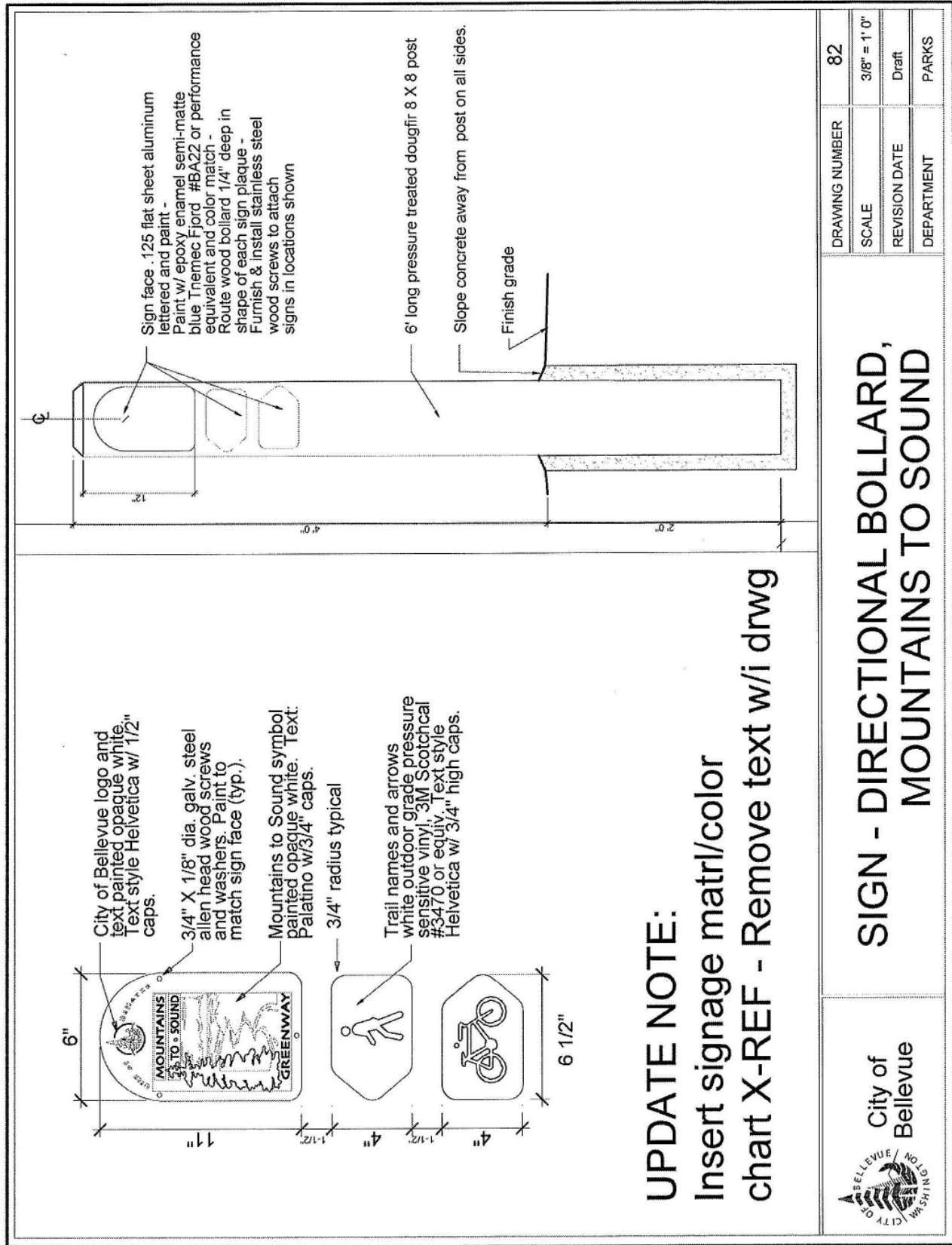


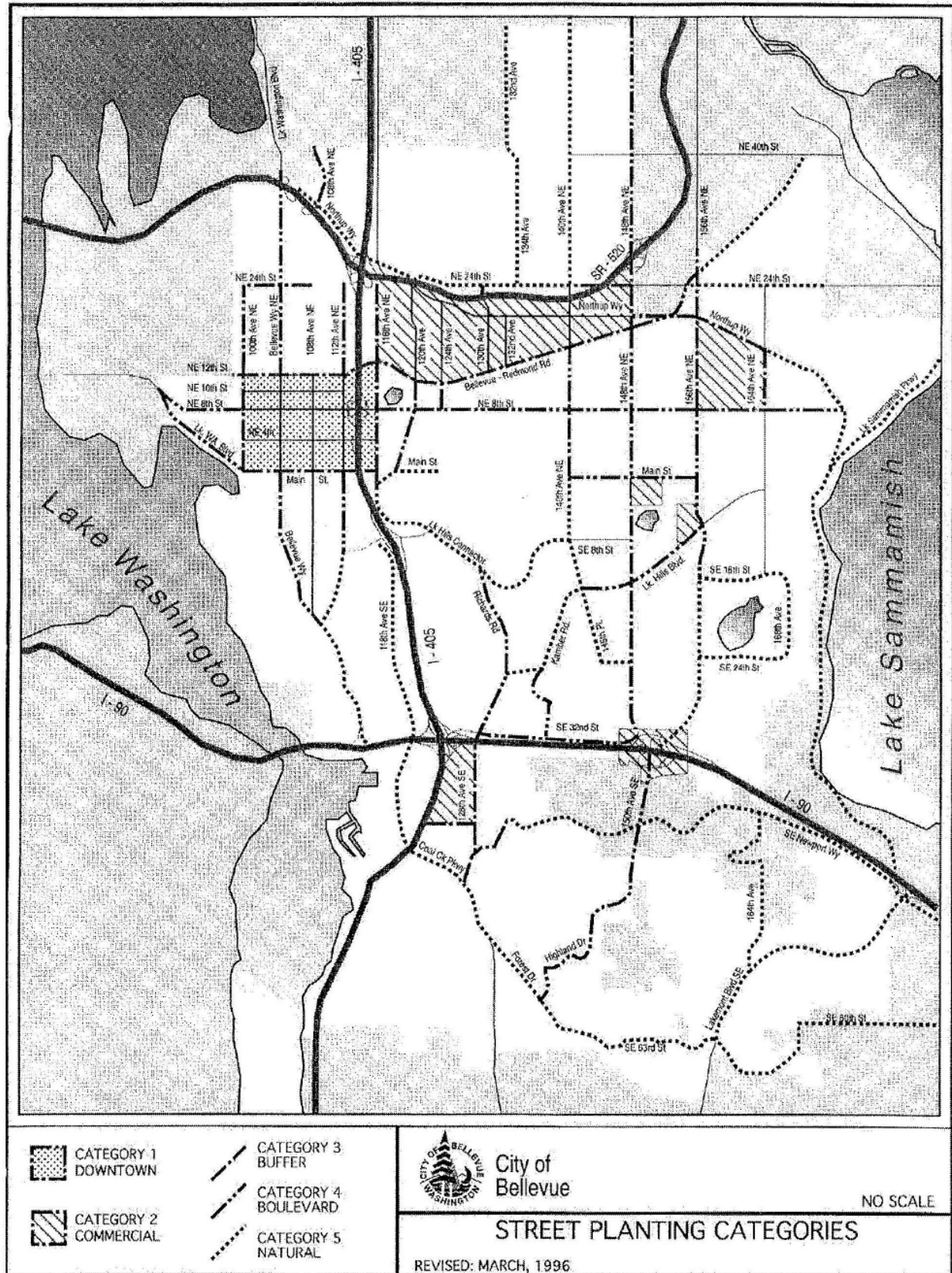




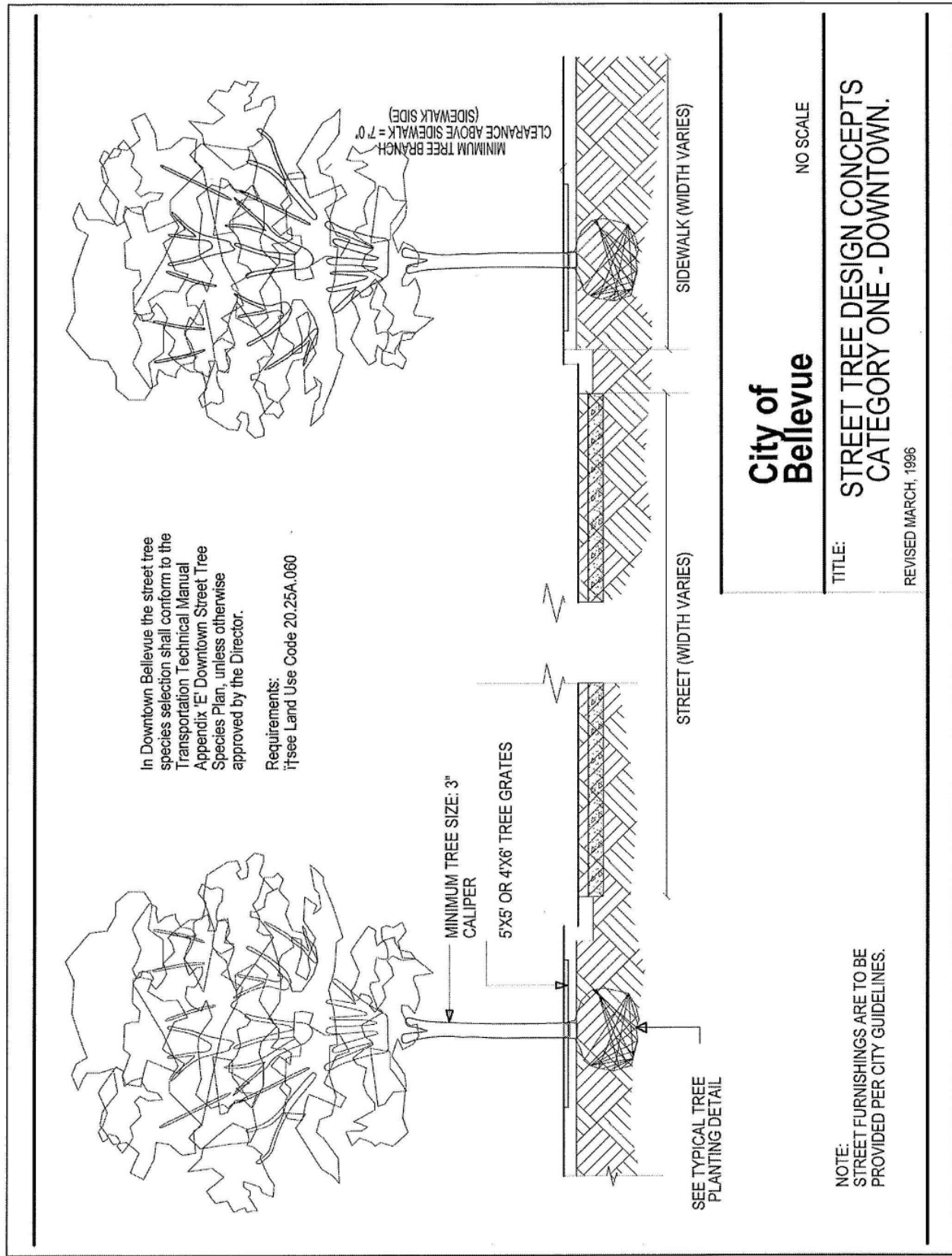




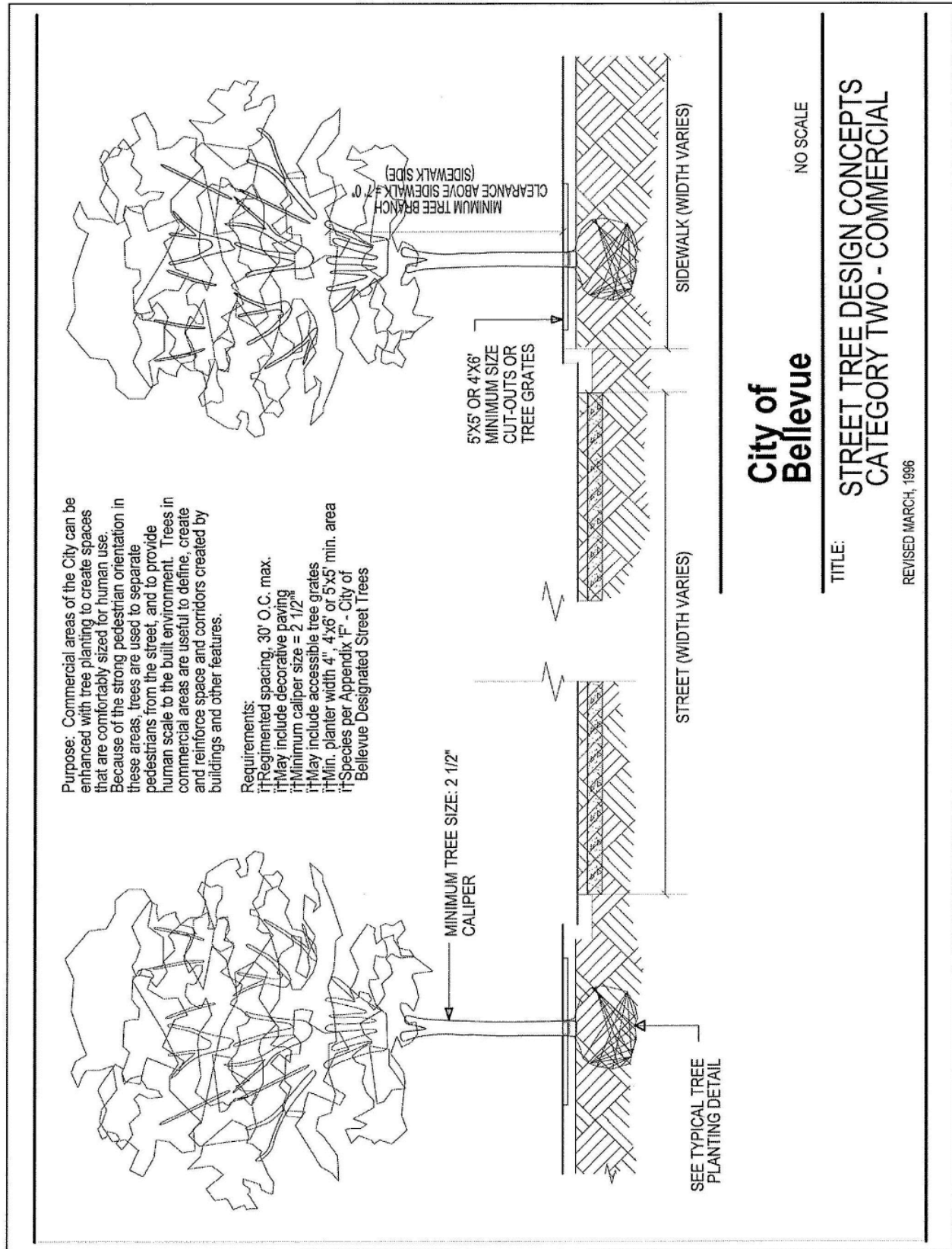


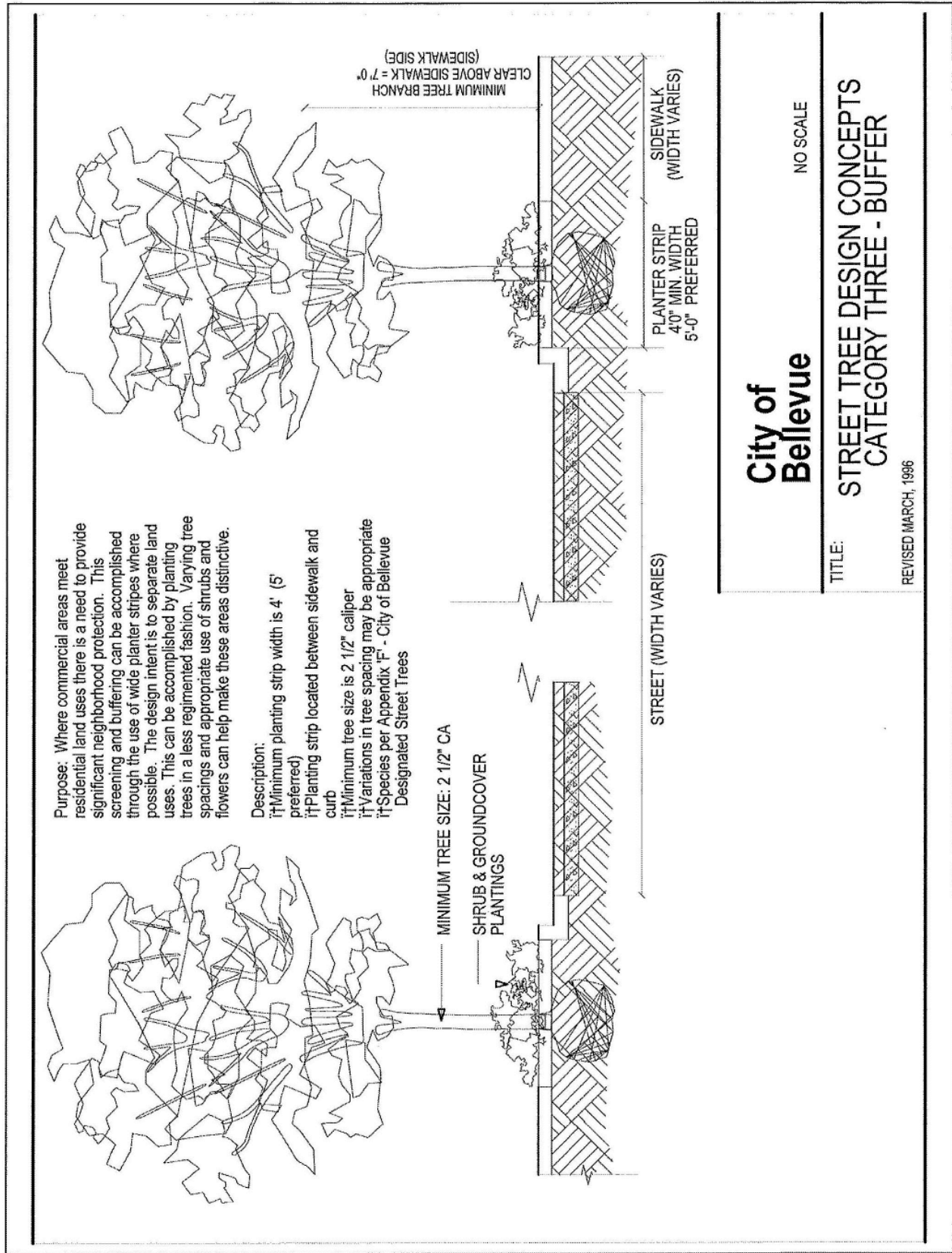




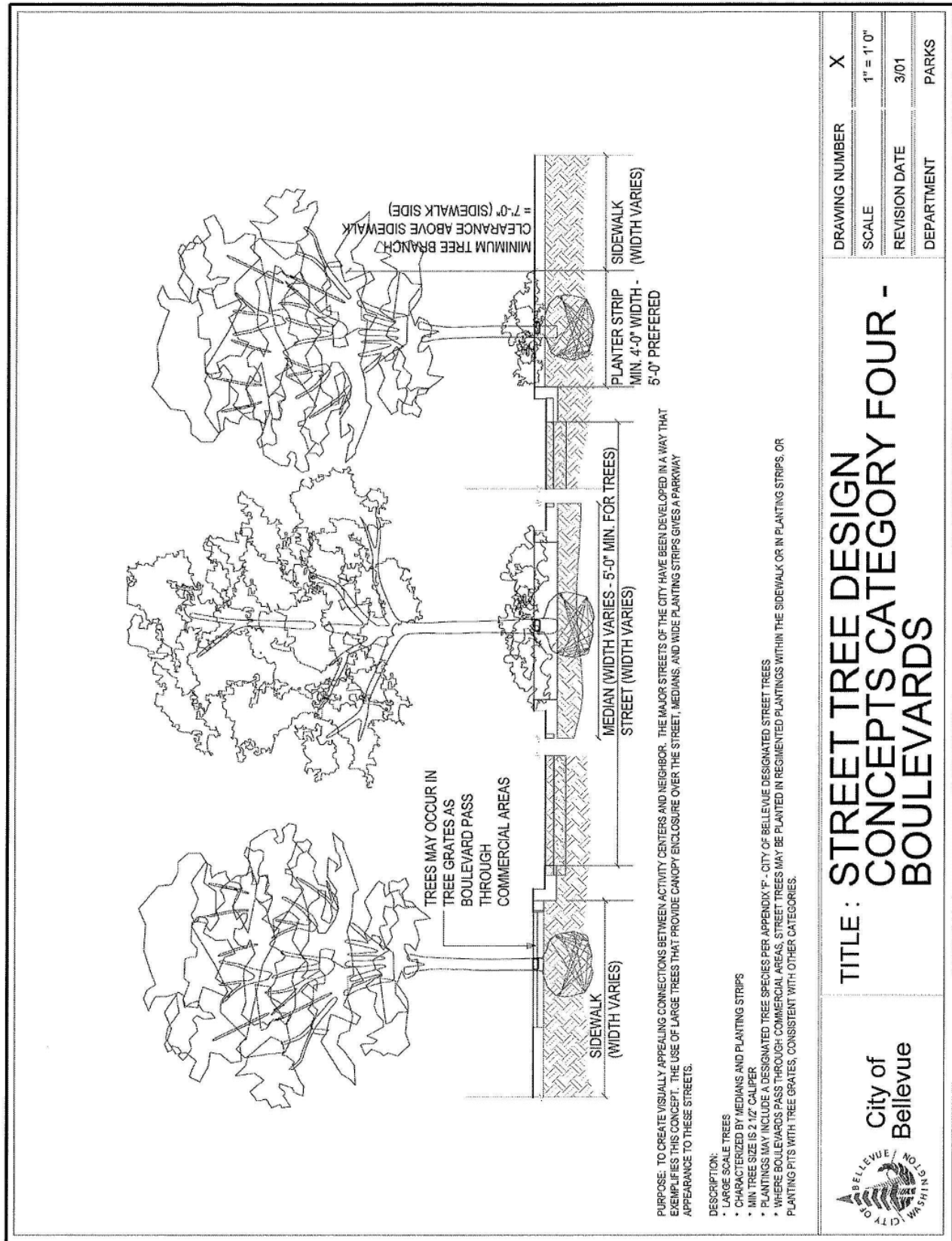




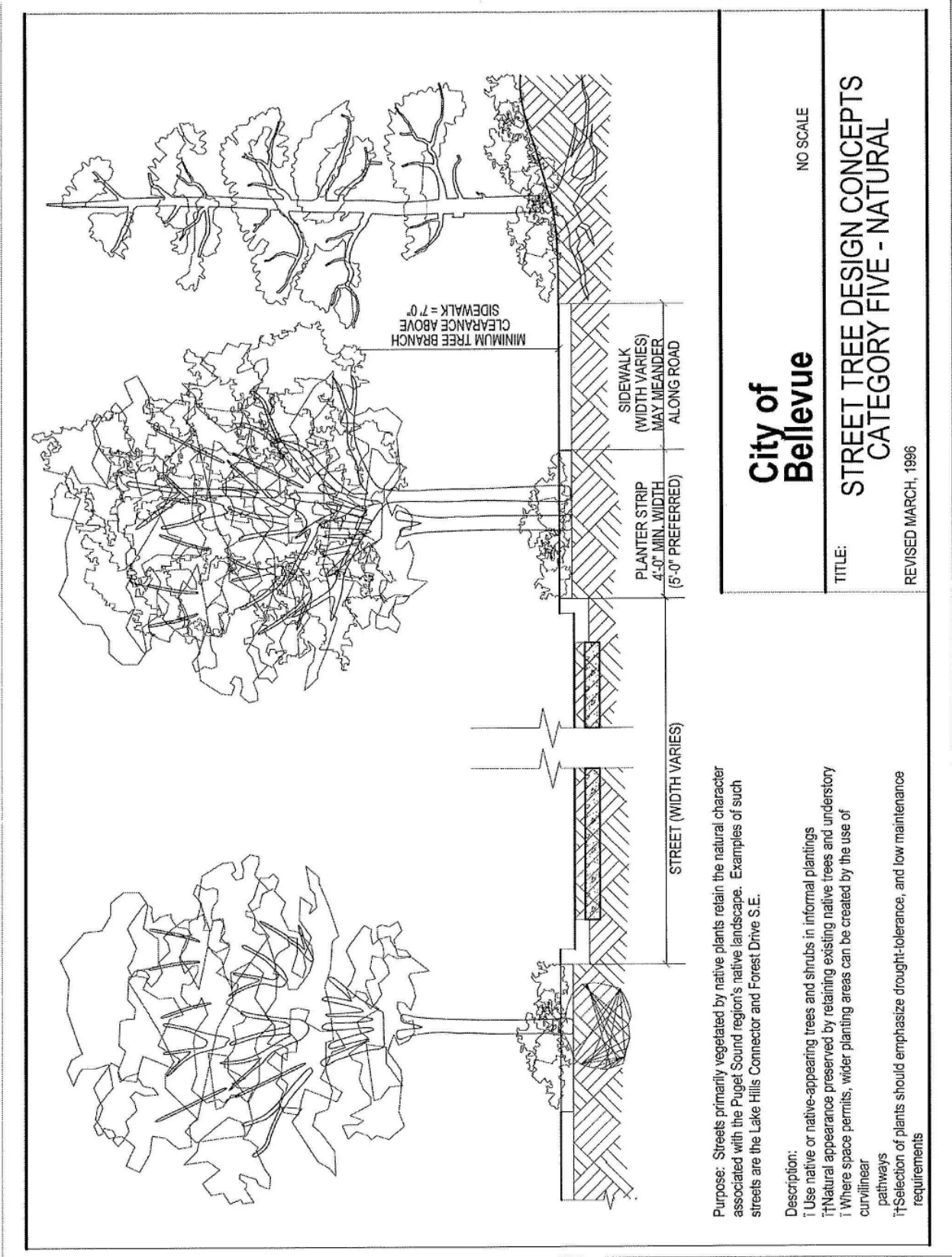


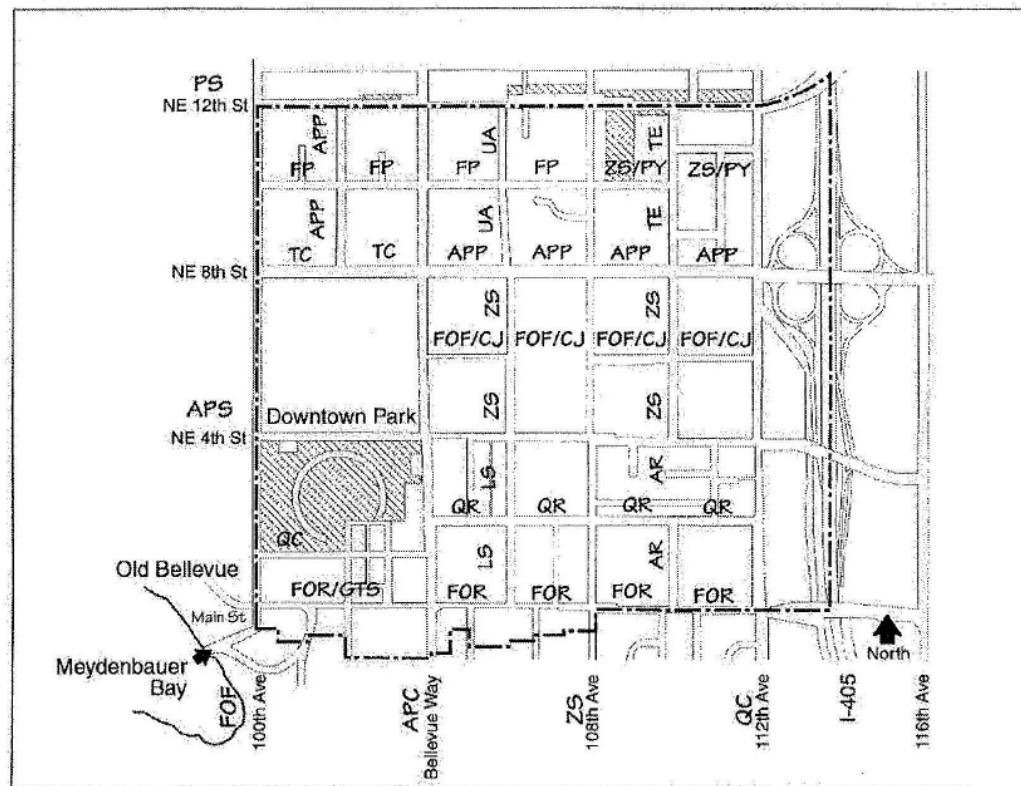












Existing parkland

CBD Boundary

Symbol Latin Name/Common Name

ACP	<i>Acer platanoides</i> 'Cleveland'/Cleveland Maple
APP	<i>Acer platanoides</i> 'Parkway'/Parkway Maple
APS	<i>Acer platanoides</i> 'Superform'/Superform Maple
AR	<i>Acer rubrum</i> /Red Maple
CJ	<i>Cercidiphyllum japonicum</i> /Katsura Tree
FOR	<i>Fraxinus ornus</i> 'Raywood'/Raywood Ash
FOF	<i>Fraxinus oxycarpa</i> 'Flame'/Flame Ash
FP	<i>Fraxinus pennsylvanica</i> 'Marshall'/Marshall Seedless Ash
GTI	<i>Gleditsia triacanthos inermis</i> /Thornless Honey Locust
GTS	<i>Gleditsia triacanthos</i> 'Skyline'/Skyline Honey Locust
LS	<i>Liquidambar styraciflua</i> /Sweet Gum
PS	<i>Prunus serrulata</i> 'Kwanzan'/Kwanzan Cherry
PY	<i>Prunus yedoensis</i> 'Akebono'/Akebono Cherry
PC	<i>Pyrus calleryana</i> 'Bradford'/Bradford Pear
QC	<i>Quercus coccinea</i> /Scarlet Oak
QR	<i>Quercus robur</i> /English Oak
TC	<i>Tilia cordata</i> /Little Leaf Linden
TE	<i>Tilia euchlora</i> 'Redmond'/Redmond Linden
UA	<i>Ulmus americana</i> 'Homestead'/Homestead Elm
ZS	<i>Zelkova serrata</i> /Zelkova



City of  
Bellevue

No Scale

## DOWNTOWN BELLEVUE STREET TREE SPECIES PLAN

REVISED MARCH, 1996





## City of Bellevue Designated Street Trees

100th Ave NE - Main St to NE 8th St	Fraxinus oxycarpa 'Flame'
100th Ave NE - NE 8th St to NE 24th St	Pyrus calleryana 'Chanticleer'
108th Ave SE - Main St to Bellevue Wy SE	Zeikova serrata 'Village Green'
108th Ave NE - Northup Wy to NE 40th St	Quercus palustris
108th Ave NE - Main St to NE 12th St	Zeikova serrata 'Village Green'
112th Ave NE - NE 12th St to NE 24th St	Quercus coccinea
112th Ave SE - SE 2nd St to Bellevue Wy SE	Native trees: Betula papyrifera/Crataegus phaenopyrum/ Pseudotsuga menziesii
116th Ave NE - NE 8th St to NE 12th St	Platanus x acerifolia 'Bloodgood'
116th Ave NE - SE 1st St to NE 8th St	Gleditsia triacanthos inermis
118th Ave SE - SE 8th St to SE 40th St	Native trees
119th Ave SE - Coal Creek Pkwy to SE 60th St	Liquidambar styraciflua
120th Ave NE - Main St to NE 20th St	Quercus rubra
124th Ave NE - NE 8th St to Northup Wy	Crataegus mollis
128th Ave NE - SE 38th St to Coal Creek Pkwy	Acer rubrum
130th Ave NE - Bel-Red Rd to Northup Wy	Acer rubrum
132nd Ave NE - Bel-Red Rd to Northup Wy	Quercus robur
139th Ave SE - SE Eastgate Wy to Kamber Rd	Liriodendron tulipifera/Malus sp./Platanus x acerifolia
140th Ave NE/SE - SE 8th St to Bel-Red Rd	Acer platanoides 'Emerald Queen'
140th Ave NE - Bel-Red Rd to NE 24th St	Ginkgo biloba/Amelanchier sp.
145Th Pl SE - SE 8th St to SE 24th St	Native trees
148th Ave NE/SE - NE 40th St to SE Eastgate Wy	Platanus x acerifolia/Pseudotsuga menziesii
156th Ave NE - NE 8th St to Bel-Red Rd	Quercus coccinea
156th Ave NE - Bel-Red Rd to NE 24th St	Acer x freemani 'Armstrong'
156th Ave SE - SE 24th St to SE Eastgate Wy	Quercus rubra
156th Ave SE - SE 24th St to SE 16th St	Populus tremuloides
164th Ave NE - NE 8th St to NE 24th St	Acer platanoides
164th Ave SE - SE 46th Wy to Lakemont Blvd SE	Fraxinus pennsylvanica/Pseudotsuga menziesii
168th Ave SE - SE 14th St to SE 24th St	Fraxinus oxycarpa 'Raywood'
Bel-Red Road - 124th Ave NE to City limits	Platanus x acerifolia/Quercus palustris
Bellevue Way NE - NE 12th St to SR-520	Acer platanoides 'Cleveland'/Acer campestre



Bellevue Way SE - Main St to 112th Ave SE	Acer platanoides 'Crimson King'/Quercus palustris
Bellevue Way SE - 112th Ave SE to I-90	Fraxinus pennsylvanica 'Summit'/native trees
Coal Creek Parkway - I-405 to 128th Ave SE	Acer platanoides 'Olmstead'
Forest Drive SE - Coal Creek to Lakemont Blvd SE	Native trees/Betula jacquemontii/Fagus sylvatica/Thuja plicata
Highland Drive - SE Newport Way to Forest Dr SE	Acer ginnala/Acer platanoides/Prunus serrulata 'Kwanzan'
Kamber Road - Richards Rd to 145th Pl SE	Native trees/Crataegus phaenopyrum
Lakemont Blvd SE - 164th SE to Coal Creek Pkwy	Native trees/Fraxinus pennsylvanica 'Marshall Seedless'
Lakemont Blvd SE - I-90 to 164th Ave SE	Acer platanoides/Thuja plicata/Pseudotsuga menziesii
Lake Hills Blvd	Betula pendula
Main Street - 100th Ave to Bellevue Way	Fraxinus oxycarpa 'Raywood'/Gleditsia triacanthos inermis
Main Street - 112th Ave to 116th Ave	Fraxinus oxycarpa 'Raywood'
Main Street - 140th Ave to 156th Ave	Gleditsia triacanthos inermis/Carpinus betulus 'Columnaris'
NE 8th St - 92nd Ave NE to 100th Ave NE	Carpinus betulus 'Columnaris'
NE 8th St - 116th Ave NE to 164th Ave NE	Pyrus calleryana 'Aristocrat'/Platanus x acerifolia
NE 12th St - 100th Ave NE to 124th Ave NE	Prunus serrulata 'Kwanzan'/Tilia americana
NE 24th St - 98th Ave NE to Bellevue Wy NE	Cercis canadensis
NE 24th St - 140th Ave NE to 148th Ave NE	Acer platanoides/Prunus serrulata 'Kwanzan'/Pseudotsuga menziesii
NE 24th St - 156th Ave NE to 170th Ave NE	Prunus serrulata 'Kwanzan'
Northup Way - 124th Ave NE to 130th Ave NE	Acer platanoides 'Emerald Queen'
Northup Way - 130th Ave NE to 156th Ave NE	Acer rubrum 'Red Sunset'
Richards Road - I-90 to Lake Hills Connector	Acer rubrum/ Native trees
SE 16th St - 156th Ave SE to 160th Ave SE	Pyrus calleryana
SE 24th St - 156th Ave SE to 168th Ave SE	Pyrus calleryana/Sorbus aucuparia
SE 38th St - I-90 to 156th Ave SE	Quercus coccinea/Pseudotsuga menziesii/Acer platanoides 'Emerald Queen'/Malus floribunda 'Snowdrift'
SE 60th St - Lake Wa. Blvd to 129th Ave SE	Tilia cordata/Malus floribunda 'Snowdrift'
SE 60th St - 129th Ave SE to Coal Creek Pkwy	Native trees/Amelanchier alnifolia
SE 63rd St - Lakemont Blvd SE to Forest Drive SE	Native trees
SE Cougar Mt. Way - Lakemont Blvd to 168th Pl	Native trees
SE Eastgate Way - Richards Rd to SE 35th Pl	Quercus coccinea/Pseudotsuga menziesii/Acer platanoides 'Emerald Queen'
SE Phantom Way - 160th to 168th	Pyrus calleryana
Village Park Drive SE - Lakemont Blvd SE to City limit	Native trees
West Lake Sammamish Pkwy - City limits	Native trees





Approved Street Trees

Small-sized trees (30' or less)		* Many varieties are available, check with Parks Department for suitability																Remarks		
Latin Names	Common Names	4 feet min. planter width	5 feet min. planter width	8 feet min. planter width	10 feet min. planter width	4 feet min. dia. planter	6 feet min. dia. planter	8 feet min. dia. planter	10 feet min. dia. planter	10' - 20' spread	20' - 30' spread	30' - 40' spread	Over 40' spread	Slow growth rate	Medium growth rate	Fast growth rate	Sun/shade requirement		Drought tolerant	Tolerates poor drainage
<i>Acer buergerianum</i>	Trident Maple	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	low, spreading tree, mixed fall color	
<i>Acer campestre</i> 'Queen Elizabeth'	Queen Elizabeth Hedge Maple	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	rounded head, glossy foliage	
<i>Acer griseum</i>	Paperbark Maple	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	●	✓	peeling bark, compound leaves	
<i>Acer platanoides</i> 'Globosum'	Globe Norway Maple	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	slow growing, dense-round crown	
<i>Acer tataricum</i>	Tatarian Maple	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	extremely hardy, red seeds, showy fall color	✓
<i>Amelanchier</i> spp.*	Serviceberry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	showy, short-lived flower clusters, showy fruit	
<i>Carpinus caroliniana</i>	American Hornbeam	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	round canopy, yellow/red fall color	
<i>Catalpa bignonioides</i>	Common Catalpa	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	5 - 8 inch-long leaves	
<i>Cercis canadensis</i>	Eastern Redbud	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	horizontal branching, red petioles	
<i>Cornus kousa</i>	Korean Dogwood	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	delicate, upright branching, white flowers	
<i>Cornus nuttallii</i>	Pacific Dogwood	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	disease-prone native, open habit	
<i>Crataegus crus-galli</i> 'Inermis'	Cockspur Hawthorn	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	smooth, glossy foliage, white flowers	
<i>Crataegus laevigata</i>	Lavale Hawthorn	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	glossy foliage, orange fruit, smooth bark	
<i>Crataegus mollis</i>	Dowry Hawthorn	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	smooth, glossy foliage, white flowers	
<i>Crataegus viridis</i> 'Winter King'	Winter King Green Hawthorn	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	wide, broad-spreading crown	
<i>Crataegus phaenopyrum</i>	Washington Hawthorn	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	glossy leaves, white flowers, red fruit	
<i>Fraxinus oxycarpa</i>	Raywood Ash	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	seedless, reddish fall color	
<i>Malus</i> species & 'hybrids'	Crabapple	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	pinkish red flowers, dark red fruit	
<i>Magnolia stellata</i>	Star Magnolia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	shrubby tree, fine texture, white flowers	
<i>Prunus cerasifera</i>	Thundercloud Plum	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	dark purple foliage	
<i>Prunus sargentii</i> 'Accolade'	Accolade Sargent Cherry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	pink flowers, upright form	
<i>Prunus serrulata</i> 'Amanogawa'	Amanogawa Cherry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	very columnar, light pink flowers	
<i>Prunus serrulata</i> 'Kwanzan'	Kwanzan Cherry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	branches stiffly upright, rosy pink flowers	
<i>Sorbus aucuparia</i>	European Mountain Ash	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	compound leaves, showy orange berries	
<i>Syringa reticulata</i> 'Regent'	Regent Japanese Lilac	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	showy white flowers	





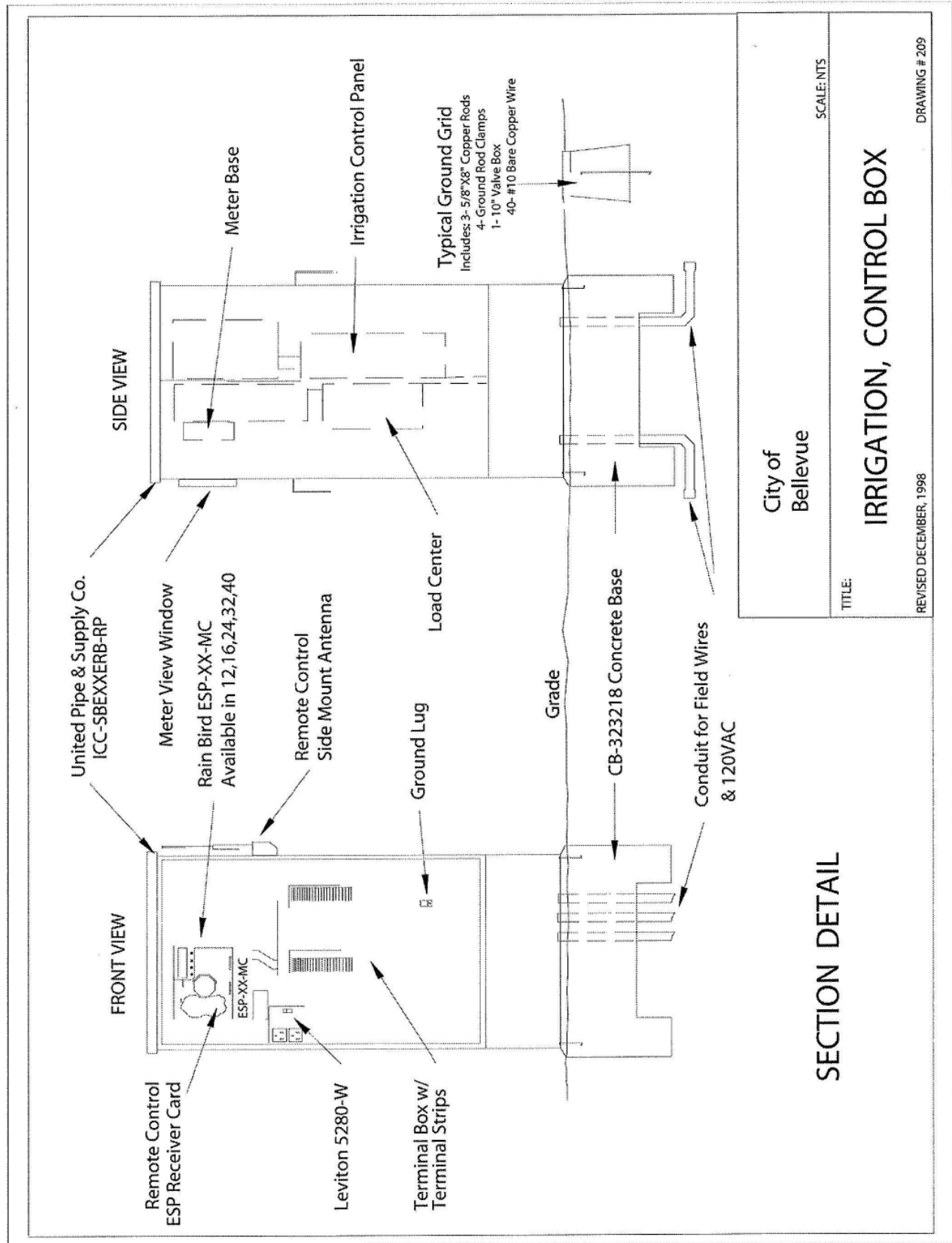
Approved Street Trees

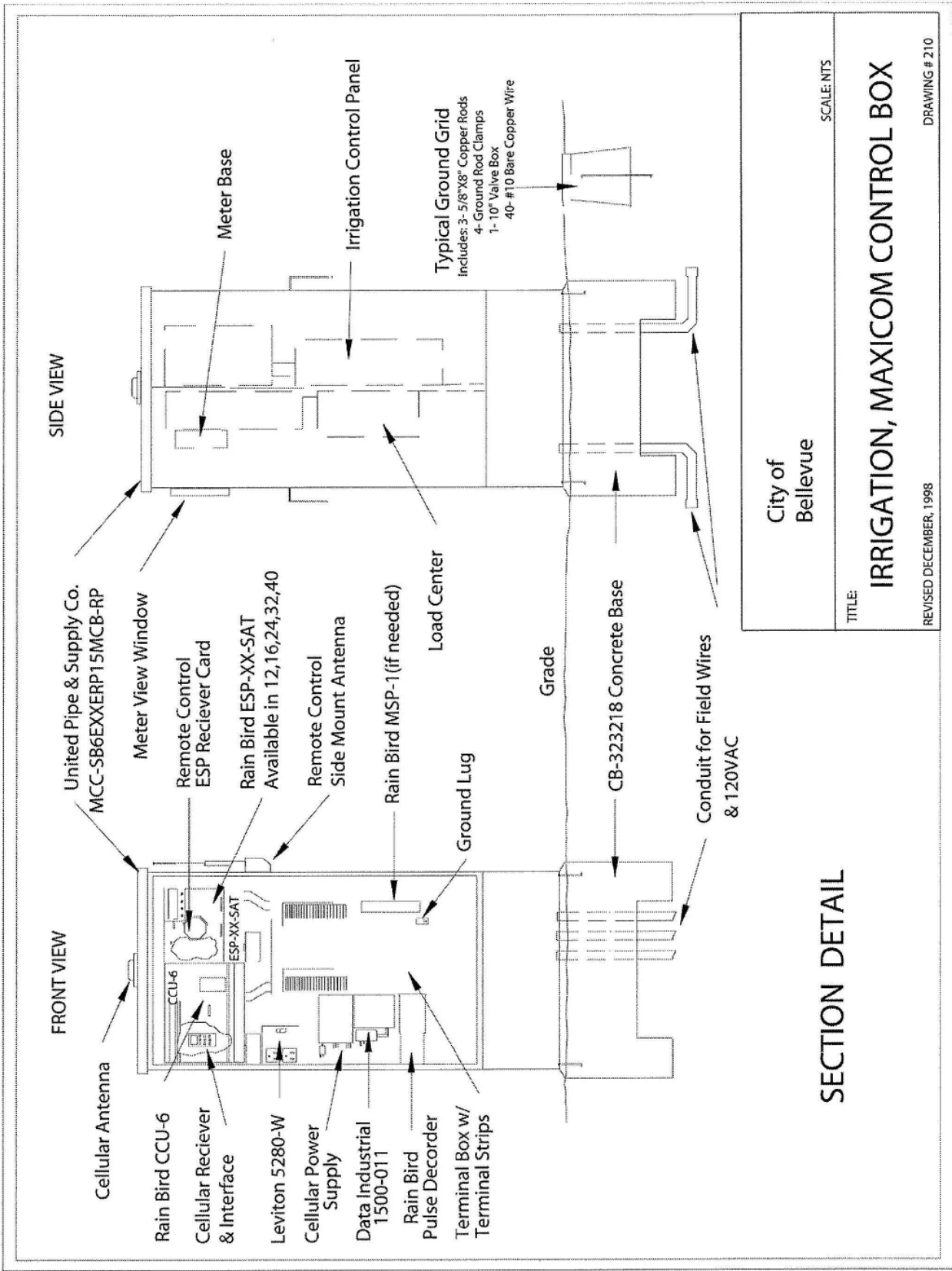
Medium-sized trees (30' to 50')																						
* Many varieties are available, check with Parks Department for suitability																						
Latin Names	Common Names	4 feet min. planter width	5 feet min. planter width	6 feet min. planter width	8 feet min. planter width	10 feet min. planter width	10' - 20' spread	20' - 30' spread	30' - 40' spread	Over 40' spread	Slow growth rate	Medium growth rate	Fast growth rate	Sun/shade requirement	Drought tolerant	Tolerates poor drainage	Remarks					
<i>Acer platanoides</i> *	Norway Maple	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	med. to med. large shade trees					
<i>Acer pseudoplatanum</i>	Sycamore Maple	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	similar to Platanus					
<i>Acer rubrum</i> *	Red Maple	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	scarlet fall color, ('Armstrong' var. spire-like)					
<i>Aesculus x carnea 'Brioti'</i>	Red Flowering Horsechestnut	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	rosy-crimson flowers					
<i>Betula jacquemontii</i>	Jacquemontii Birch	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	tall, narrow, brilliant white bark					
<i>Betula nigra 'Heritage'</i>	Heritage River Birch	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	upright form, tan, shiny bark					
<i>Betula papyrifera</i>	Paper Birch	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	✓	classic white peeling bark, yellow fall color					
<i>Betula pendula</i>	European White Birch	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	✓	open habit, white bark, delicate lacy foliage					
<i>Carpinus betulus 'Fastigiata'</i>	Pyramidal European Hornbeam	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	dense, clean foliage, pyramidal in form					
<i>Cladrastis lutea</i>	Yellowwood Tree	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	broad, round head, fragrant flowers					
<i>Catalpa speciosa</i>	Western Catalpa	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	needs pruning to attain proper street tree form					
<i>Celtis laevigata 'All Seasons'</i>	All Seasons Sugar Hackberry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	open shade tree					
<i>Celtis occidentalis</i>	Common Hackberry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	broad, open canopy					
<i>Cercidiphyllum japonicum</i>	Katsura Tree	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	soft textured spreading shade tree					
<i>Corylus columa</i>	Turkish Filbert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	upright form, pest free, corky bark					
<i>Fraxinus p. 'Marshall Seedless'</i>	Marshall Seedless Ash	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	compact oval crown, seedless, glossy leaves					
<i>Ginkgo biloba</i> * (males only)	Maidenhair Tree	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	yellow fall color					
<i>Gleditsia triacanthos</i> *	Honeylocust	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	✓	spreading, horizontal branching					
<i>Koeleruteria paniculata</i>	Goldenrain Tree	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	large compound leaves, notable flowers					
<i>Magnolia grandiflora</i>	Victoria Magnolia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	evergreen foliage, white flowers					
<i>Prunus sargentii 'Columar'</i>	Columar Sargent Cherry	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	✓	more narrow and erect than species					
<i>Pyrus betulifolia</i>	Ornamental Birchleaf Pear	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	erect, narrow tree w/ arching branches					
<i>Pyrus calleryana</i> *	Gallery Pear	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	bright red fall color, 'Aristocrat' var. pyramidal					
<i>Sophora japonica 'Regent'</i>	Regent Japanese Pagoda Tree	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	young wood smooth, dk. green, vigorous					
<i>Tilia cordata</i> *	Little-leaf Linden	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	dense pyramidal form, flowers in July					
<i>Tilia tomentosa 'Green Mountain'</i>	Green Mountain Silver Linden	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	good shade tree, tolerant of severe conditions					
<i>Zelkova serrata</i> *	Zelkova	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	○	✓	✓	rough-textured shade tree, smooth grey bark					





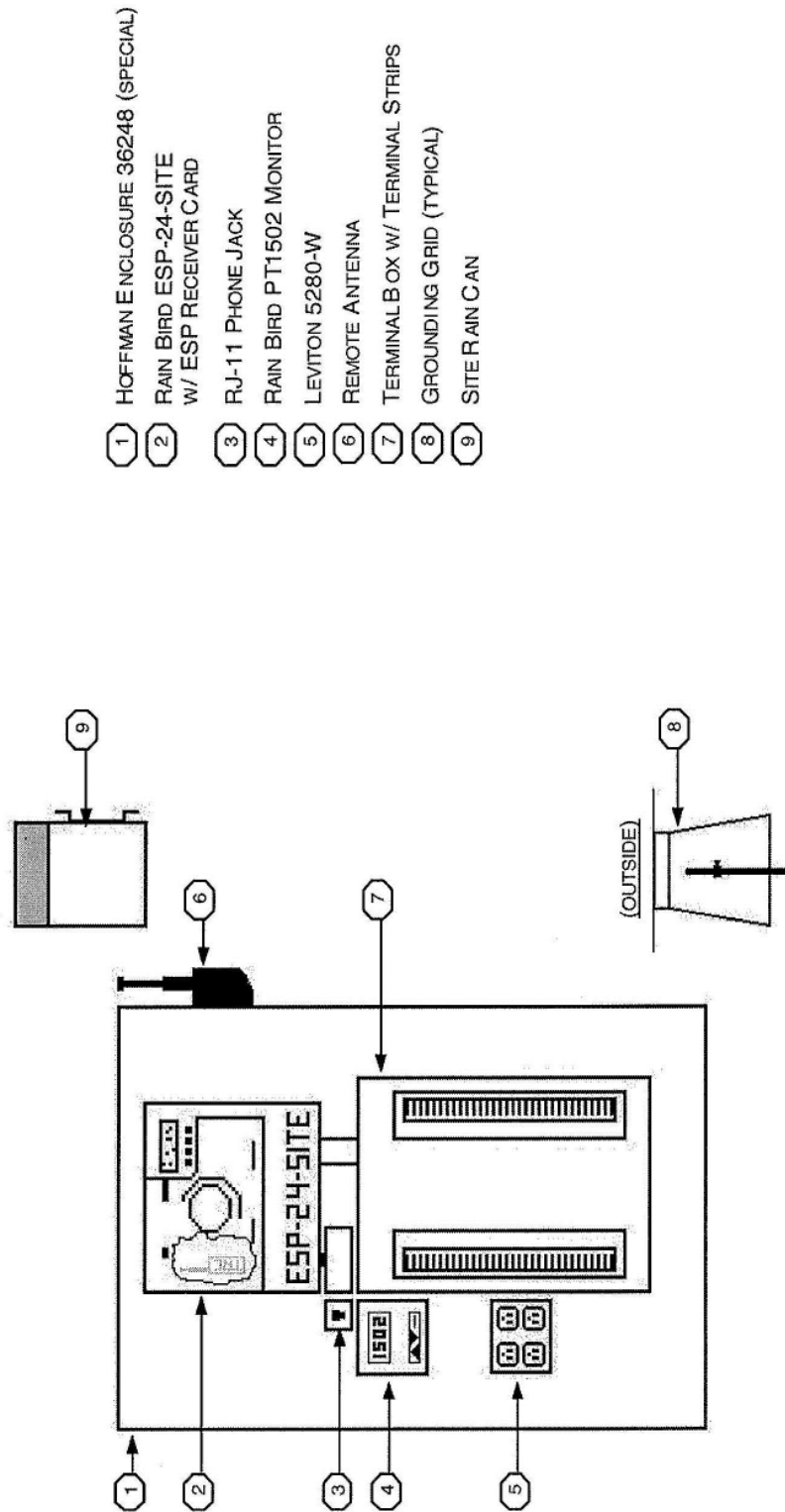






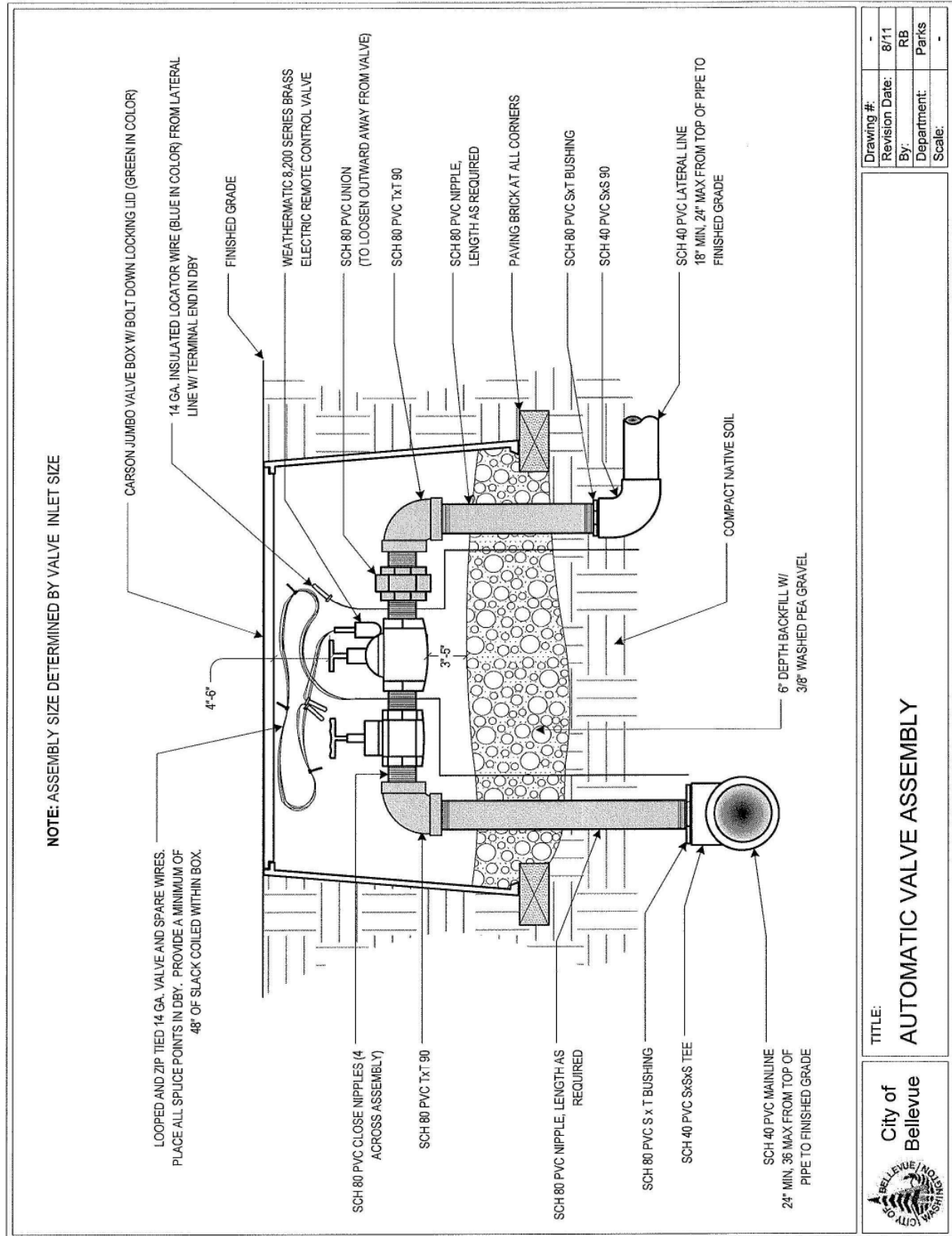


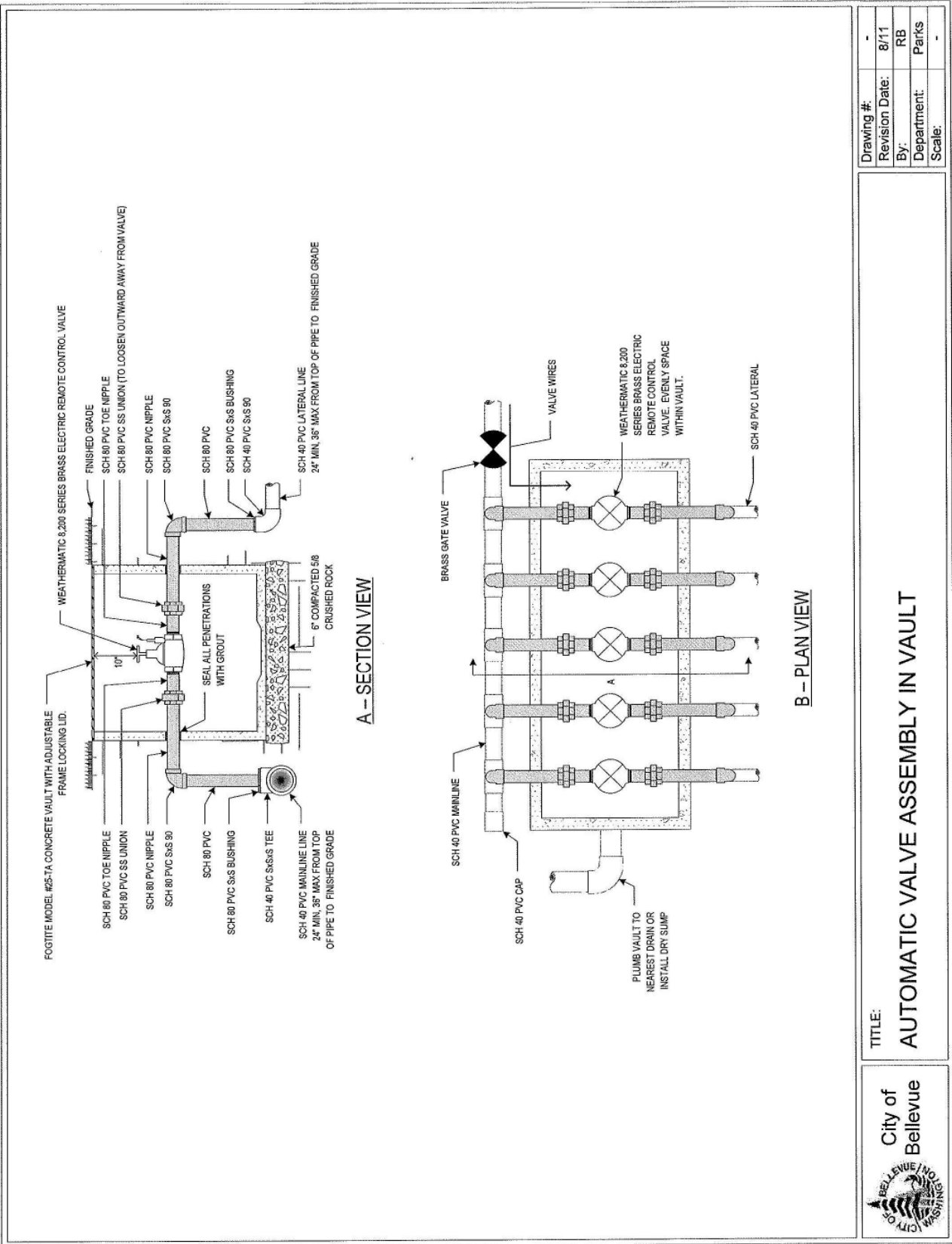
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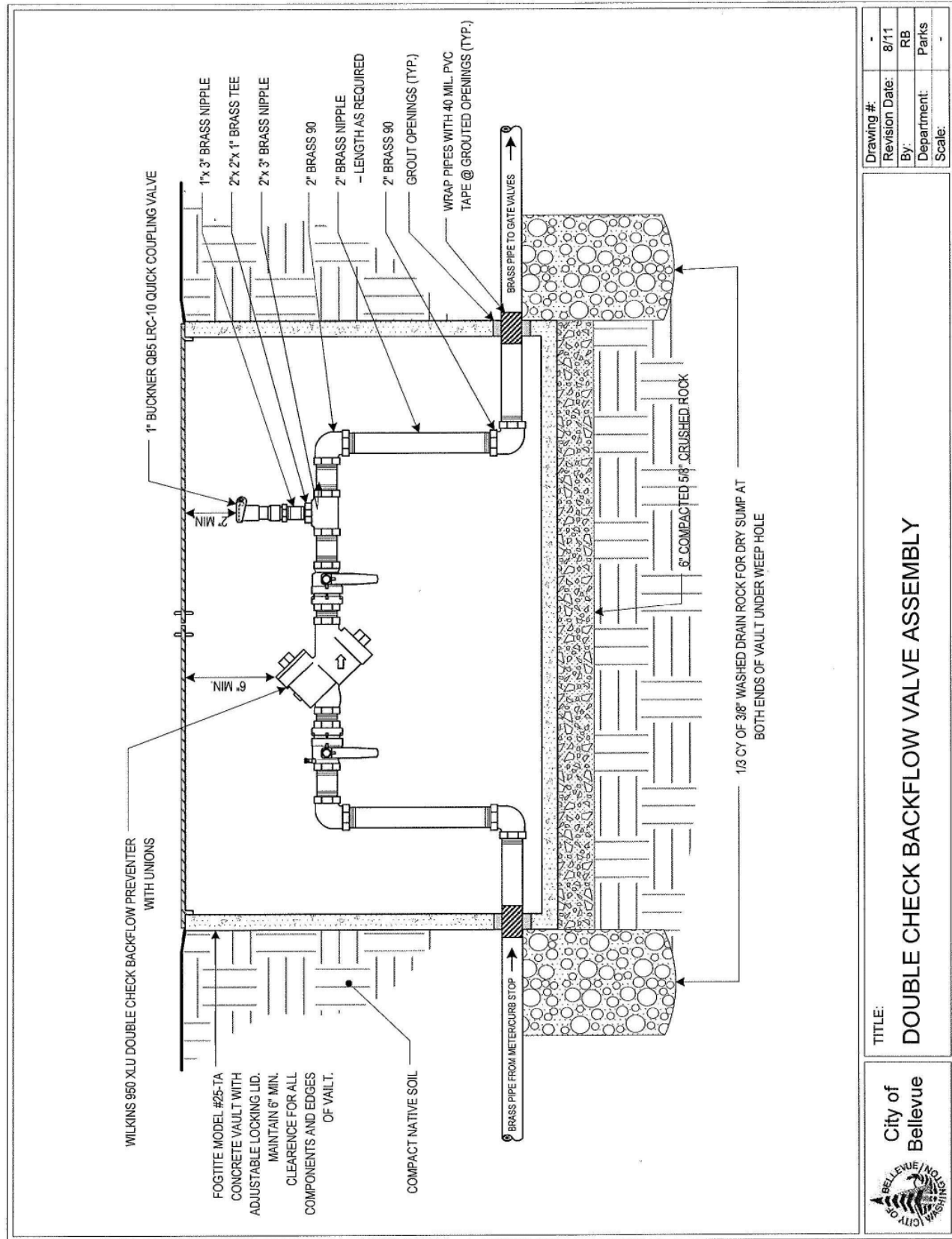
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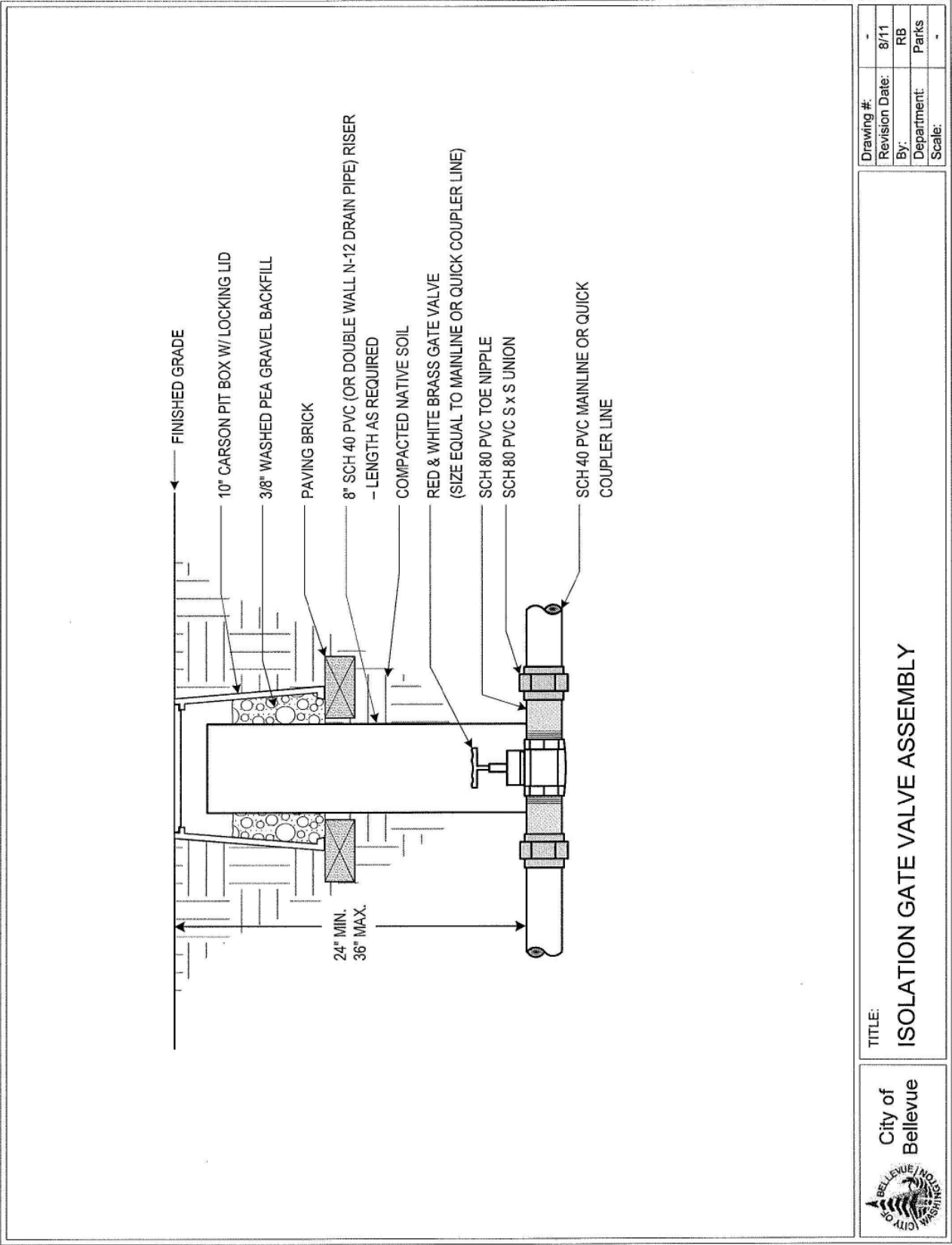
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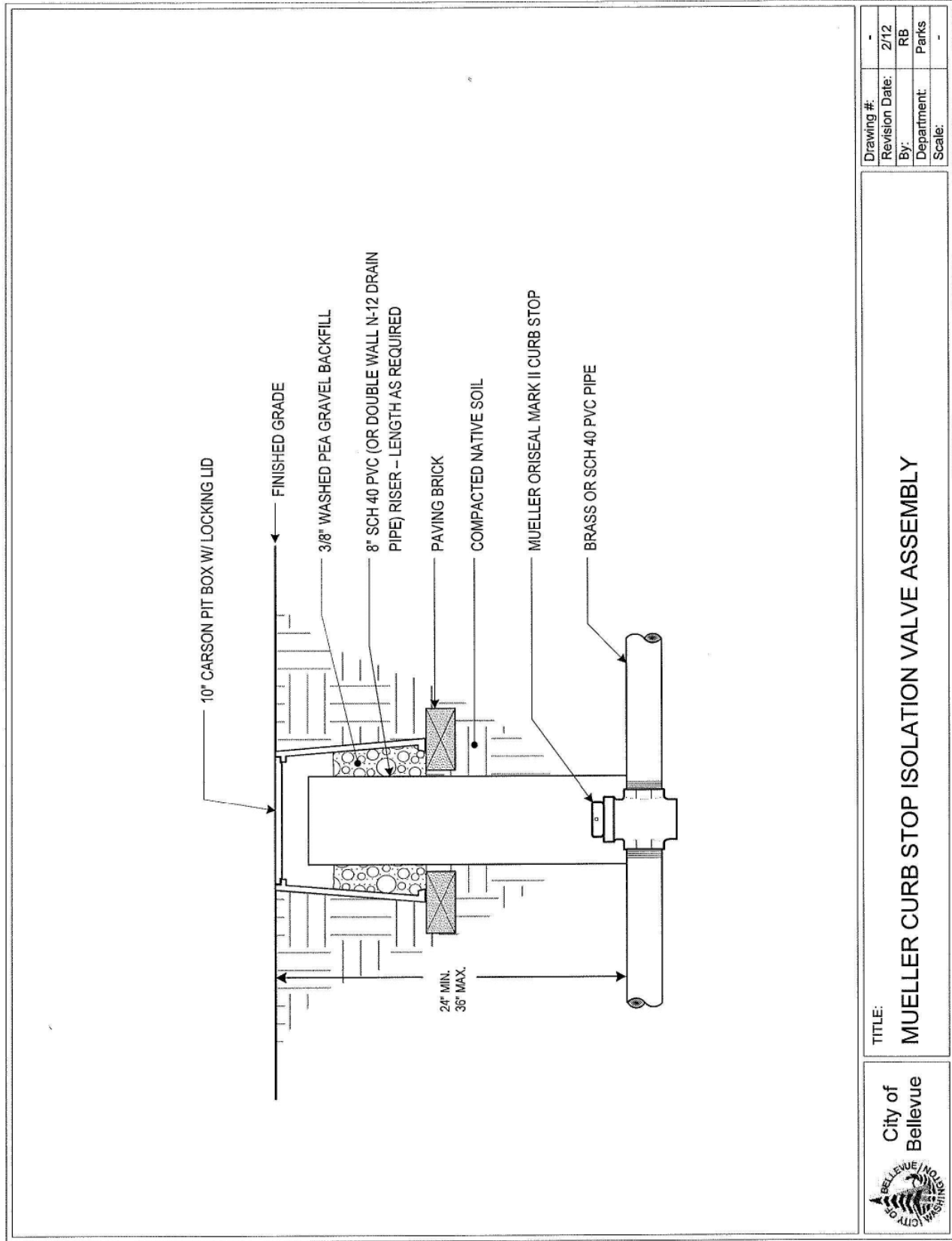




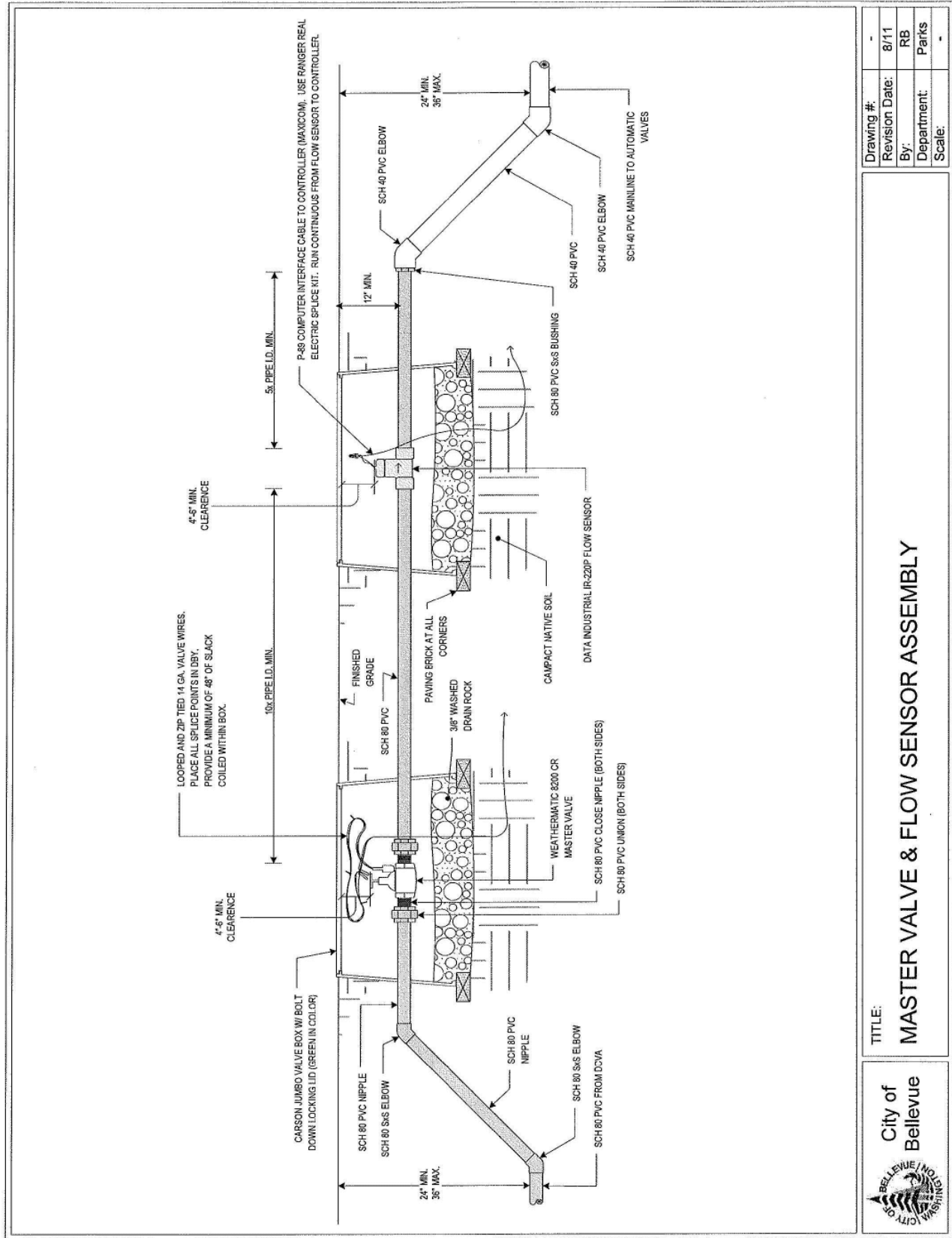


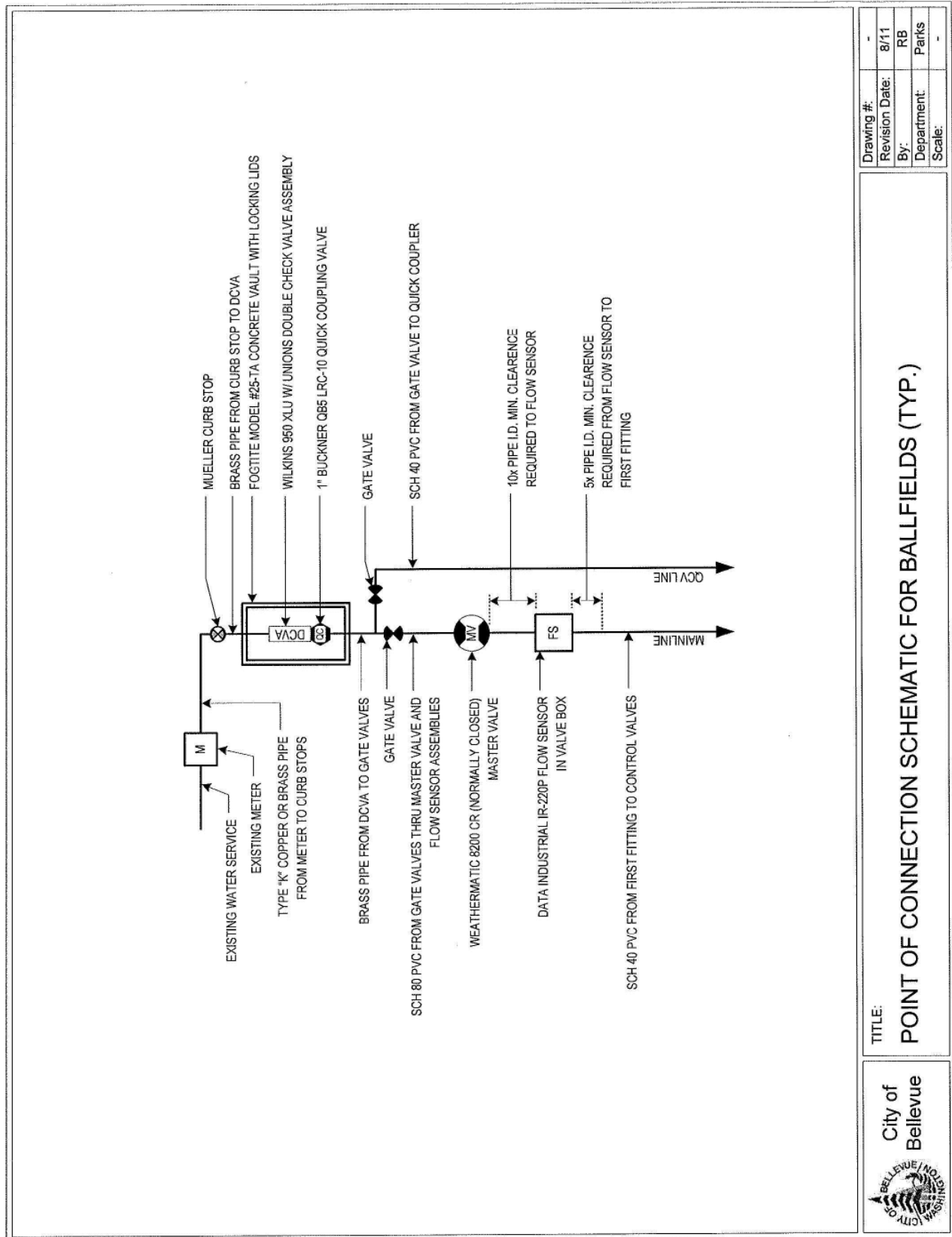








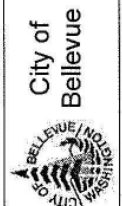


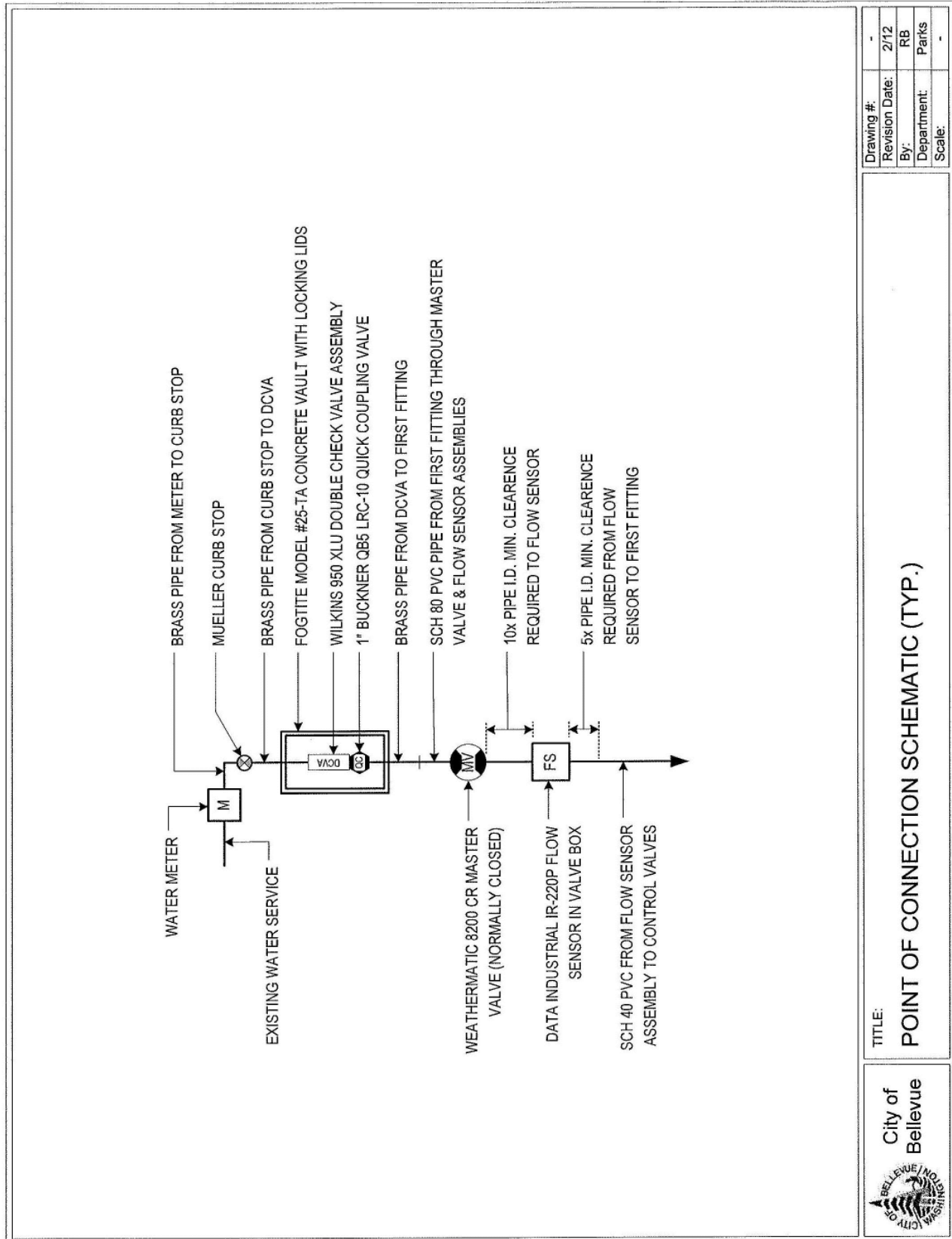


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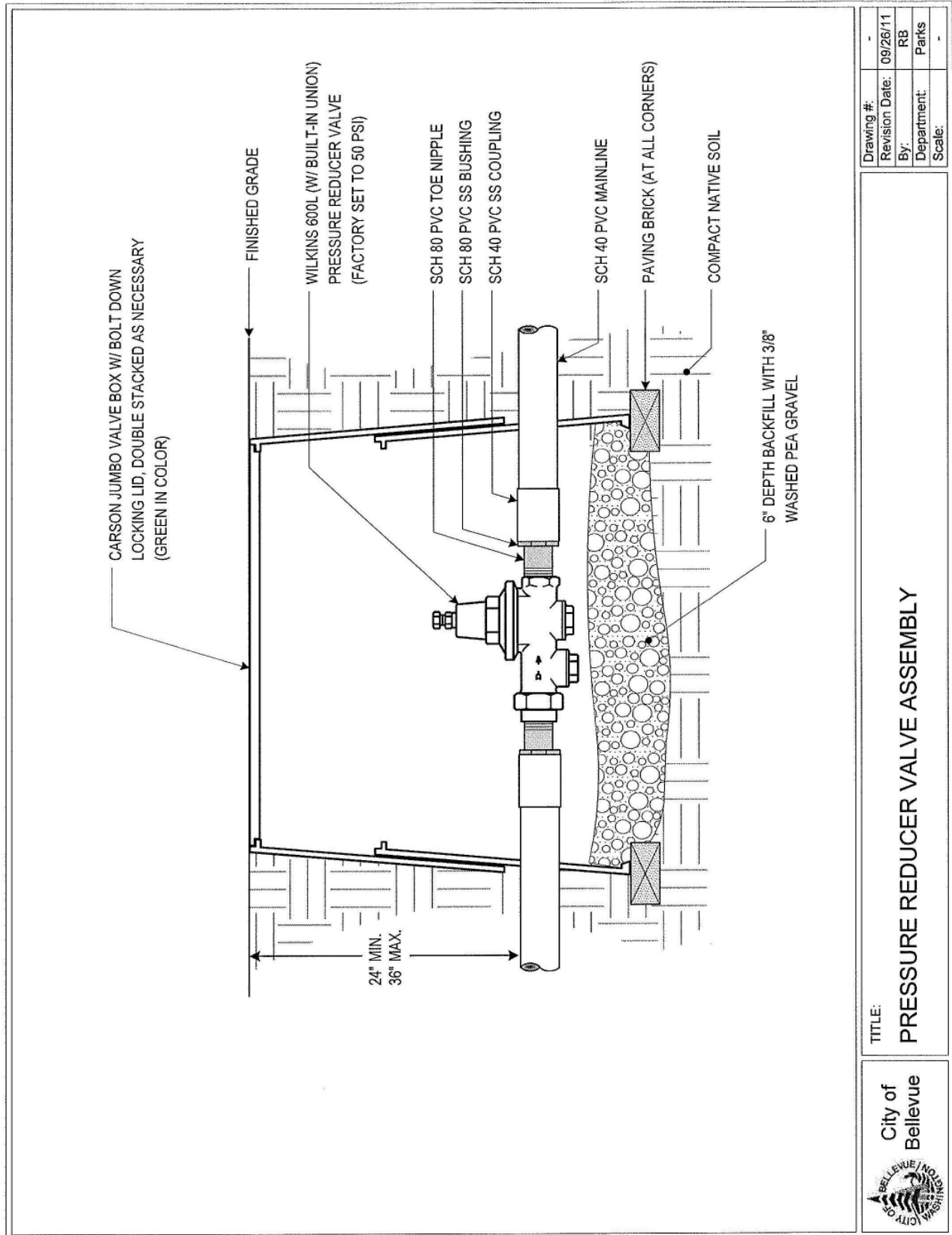
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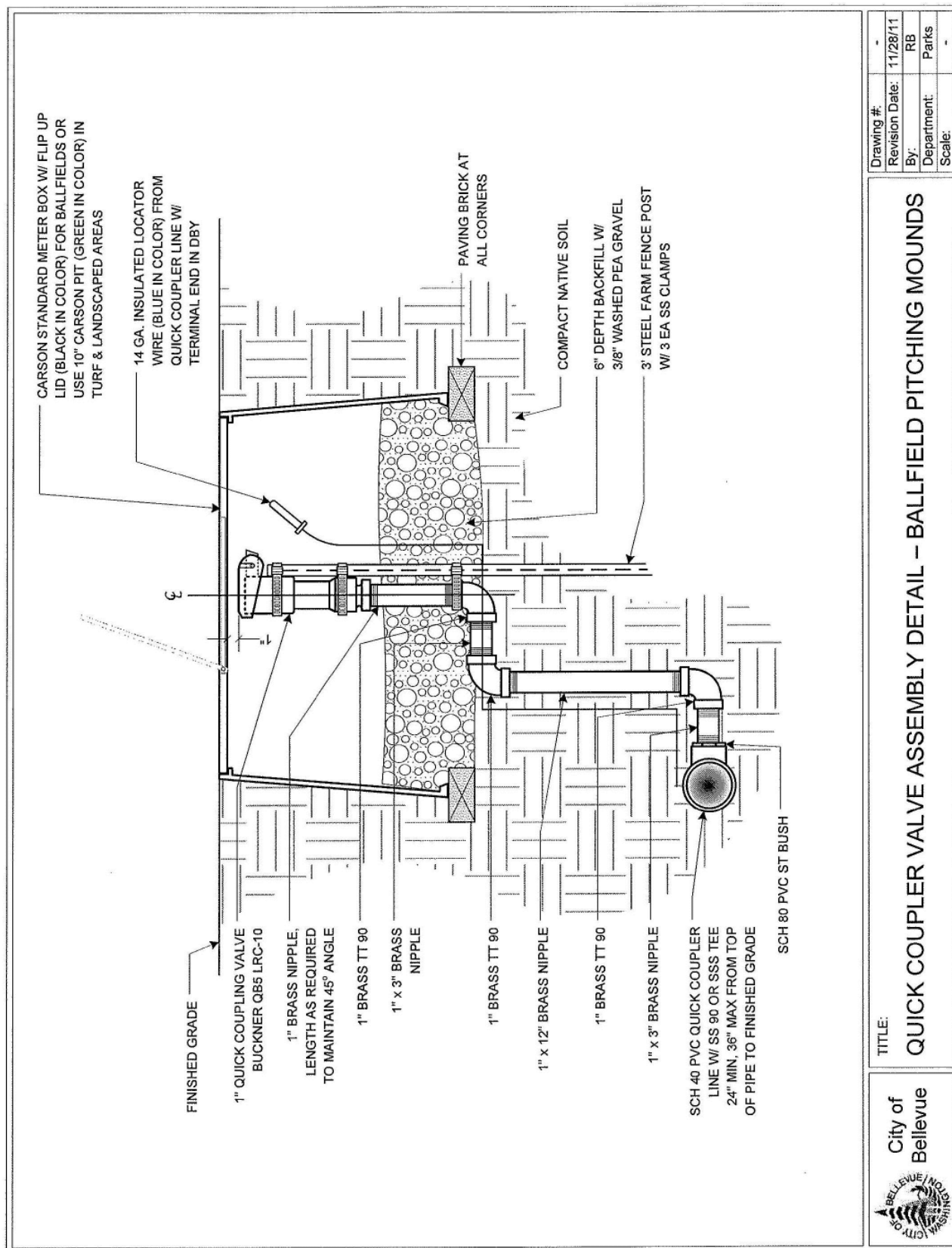
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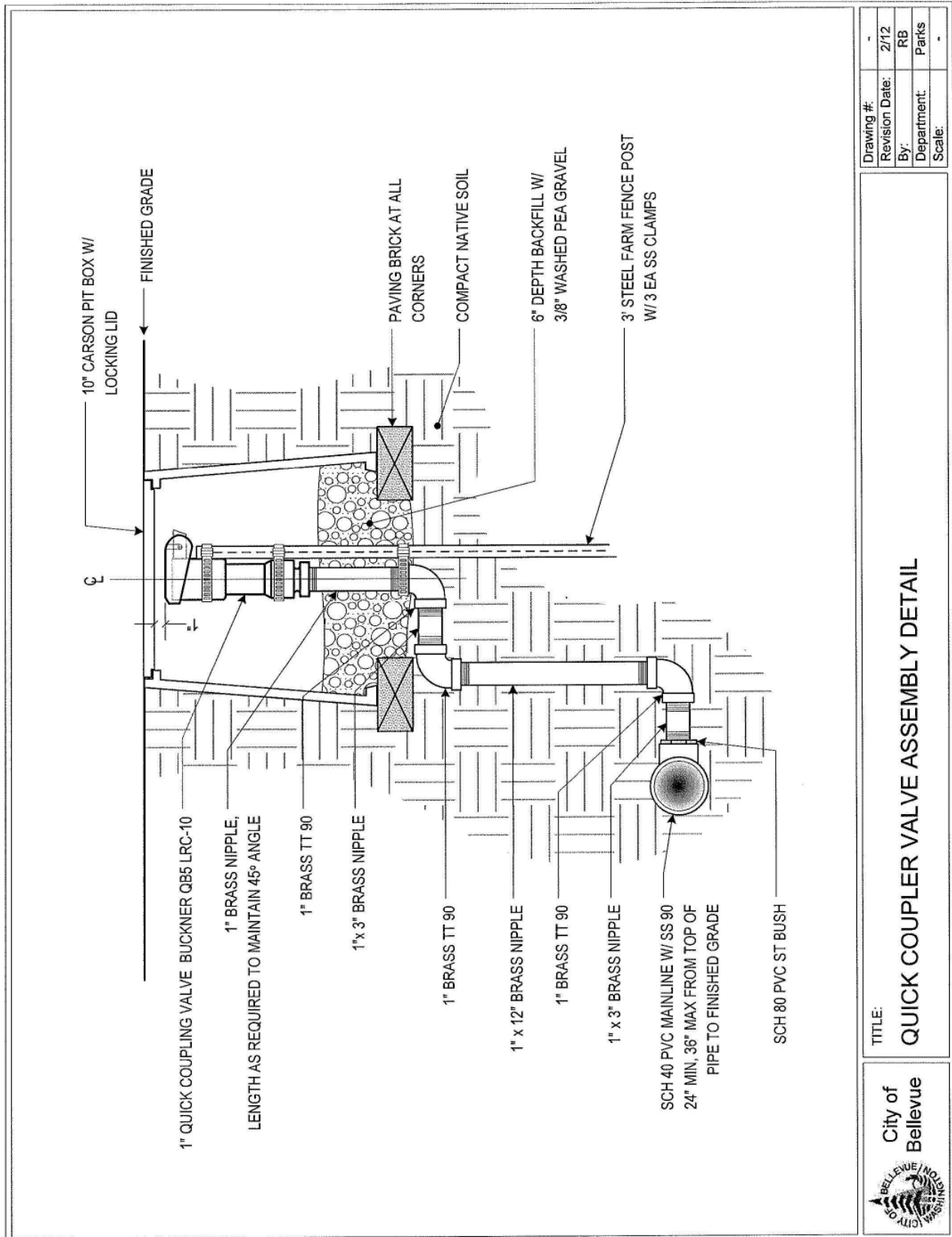




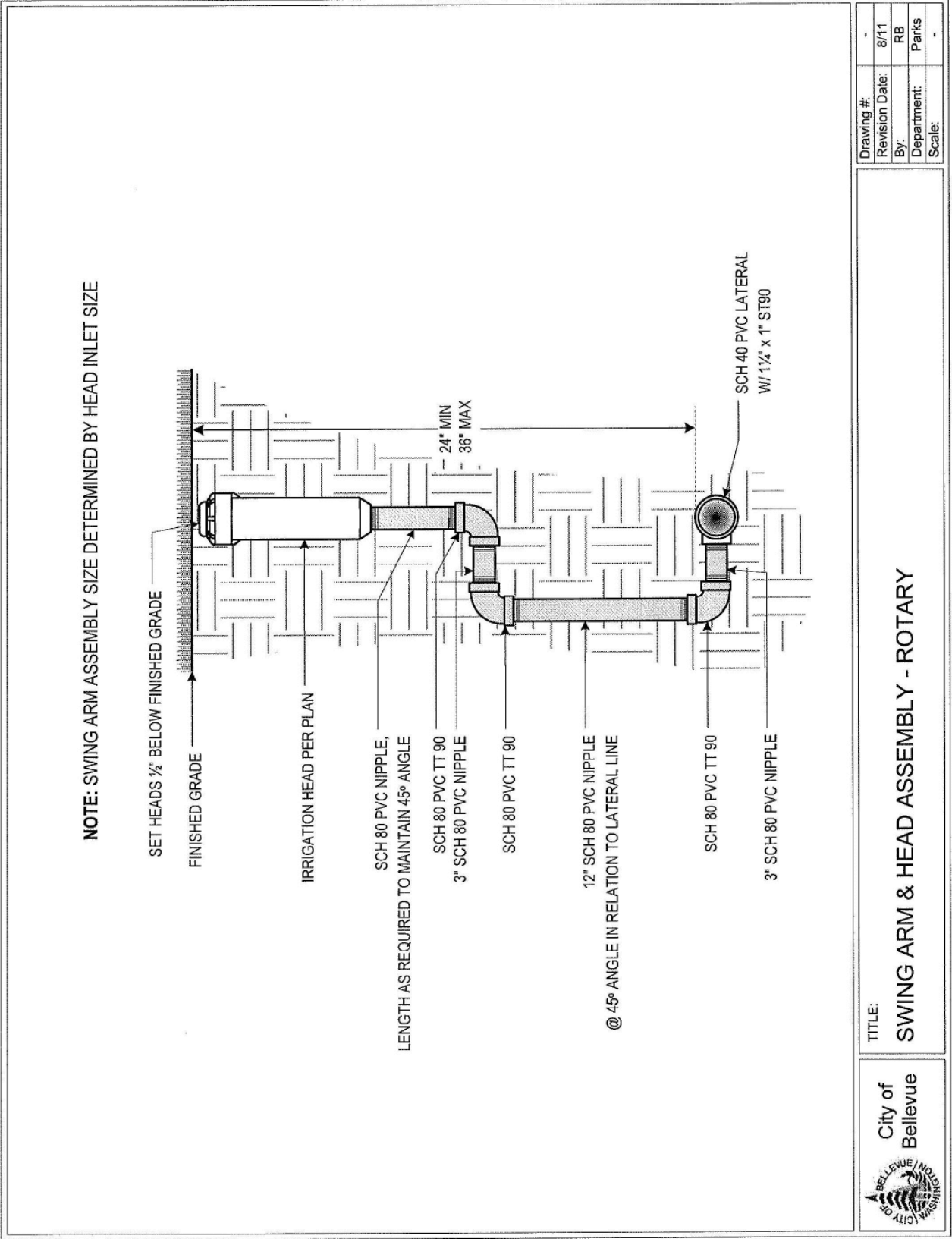


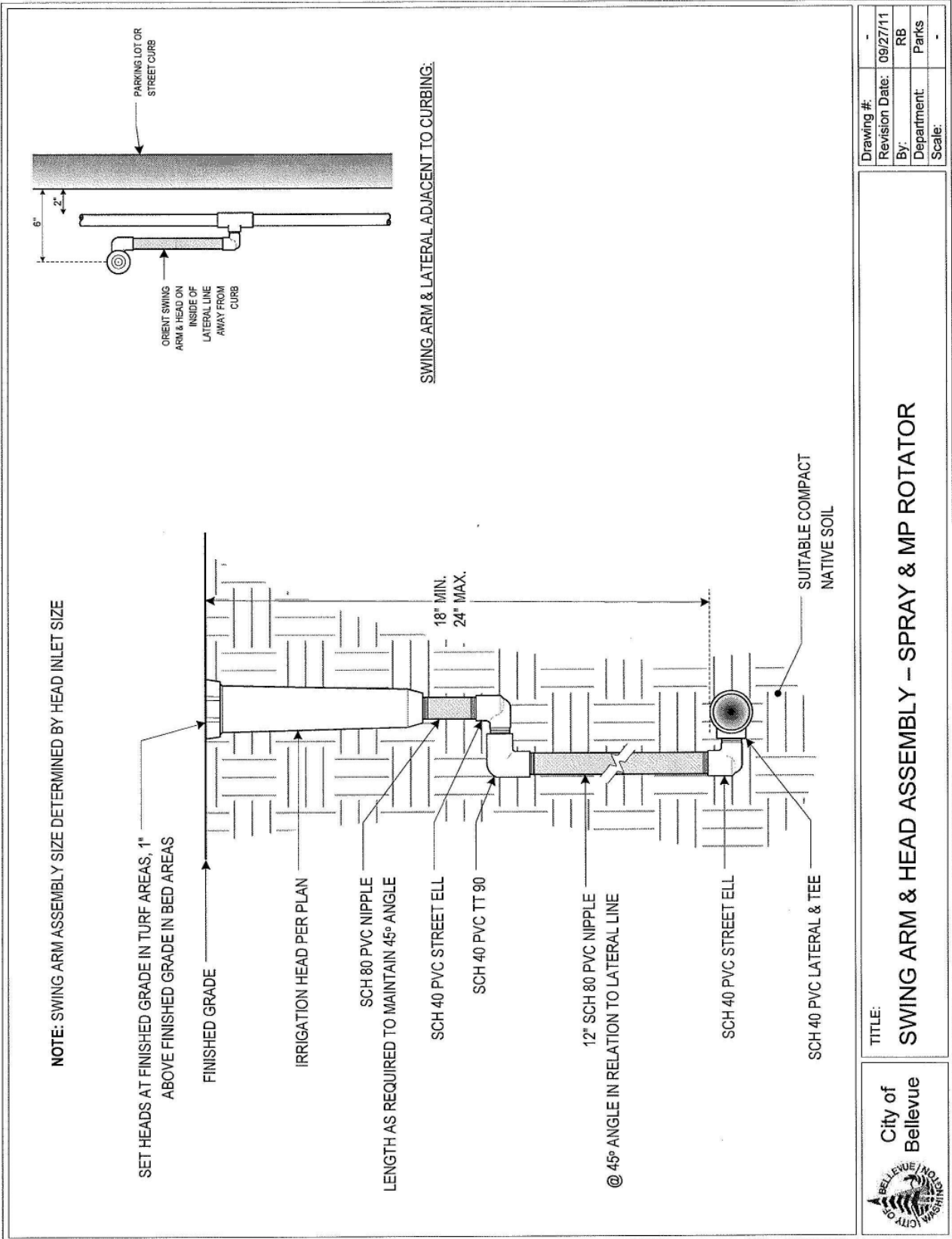


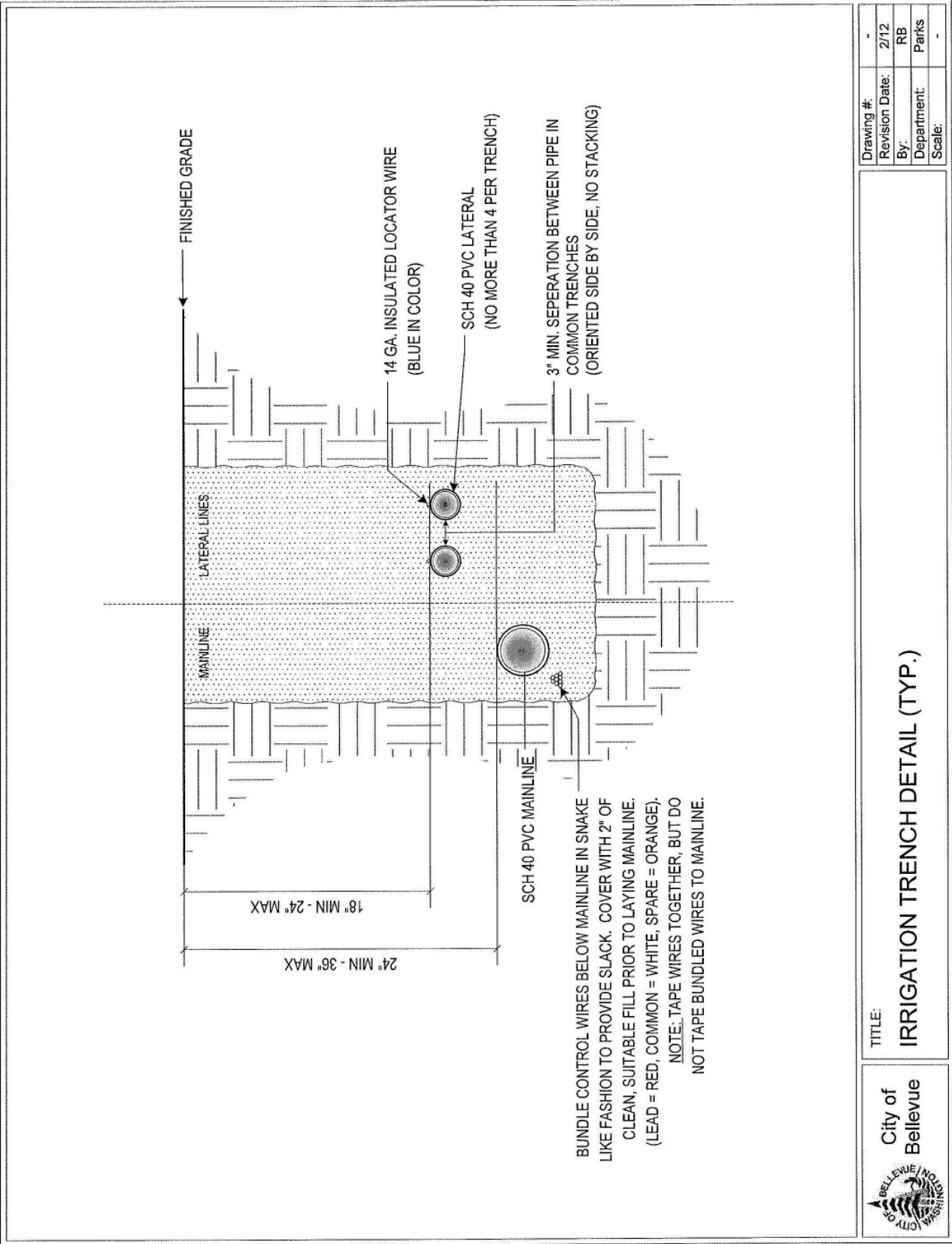




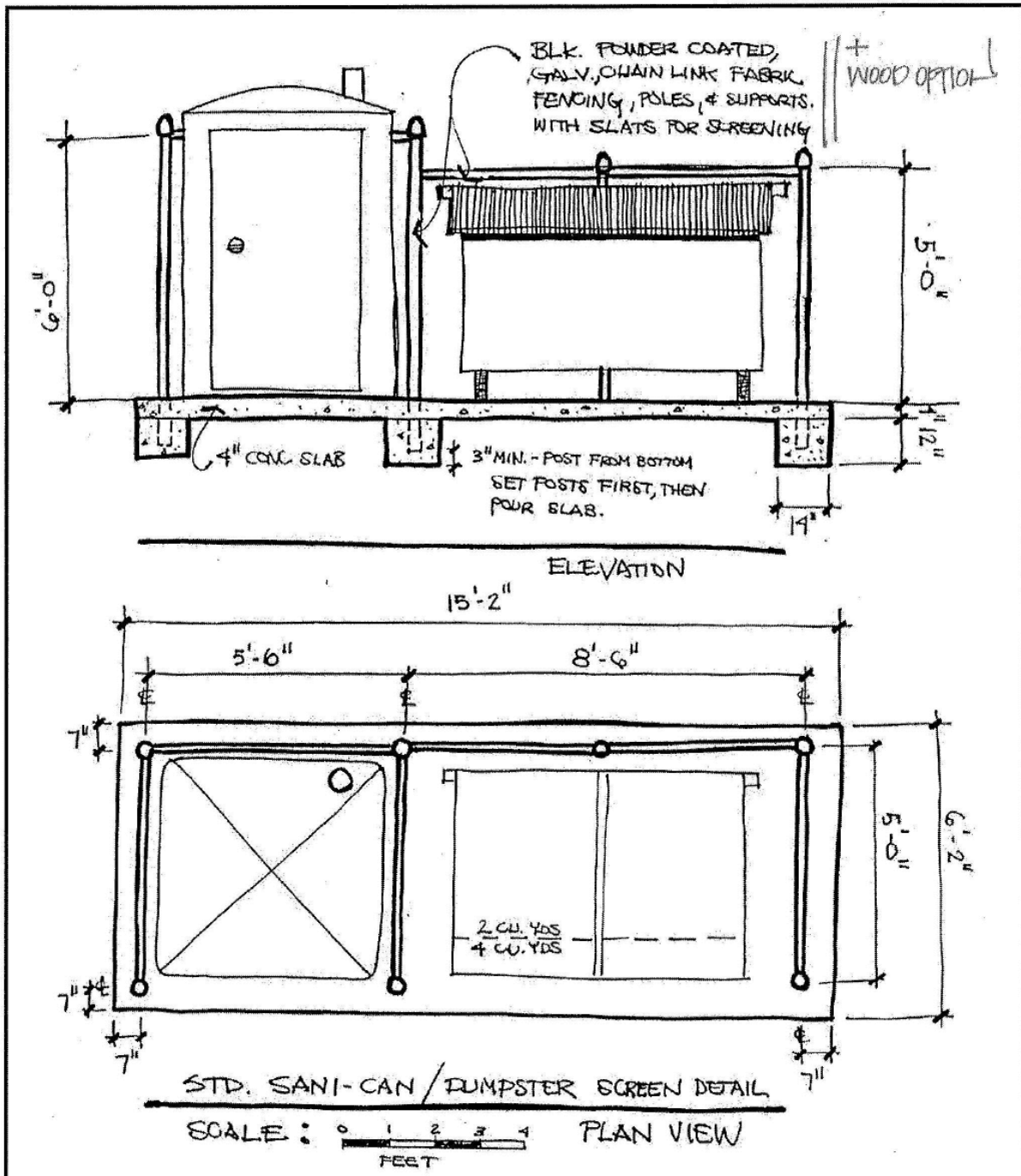




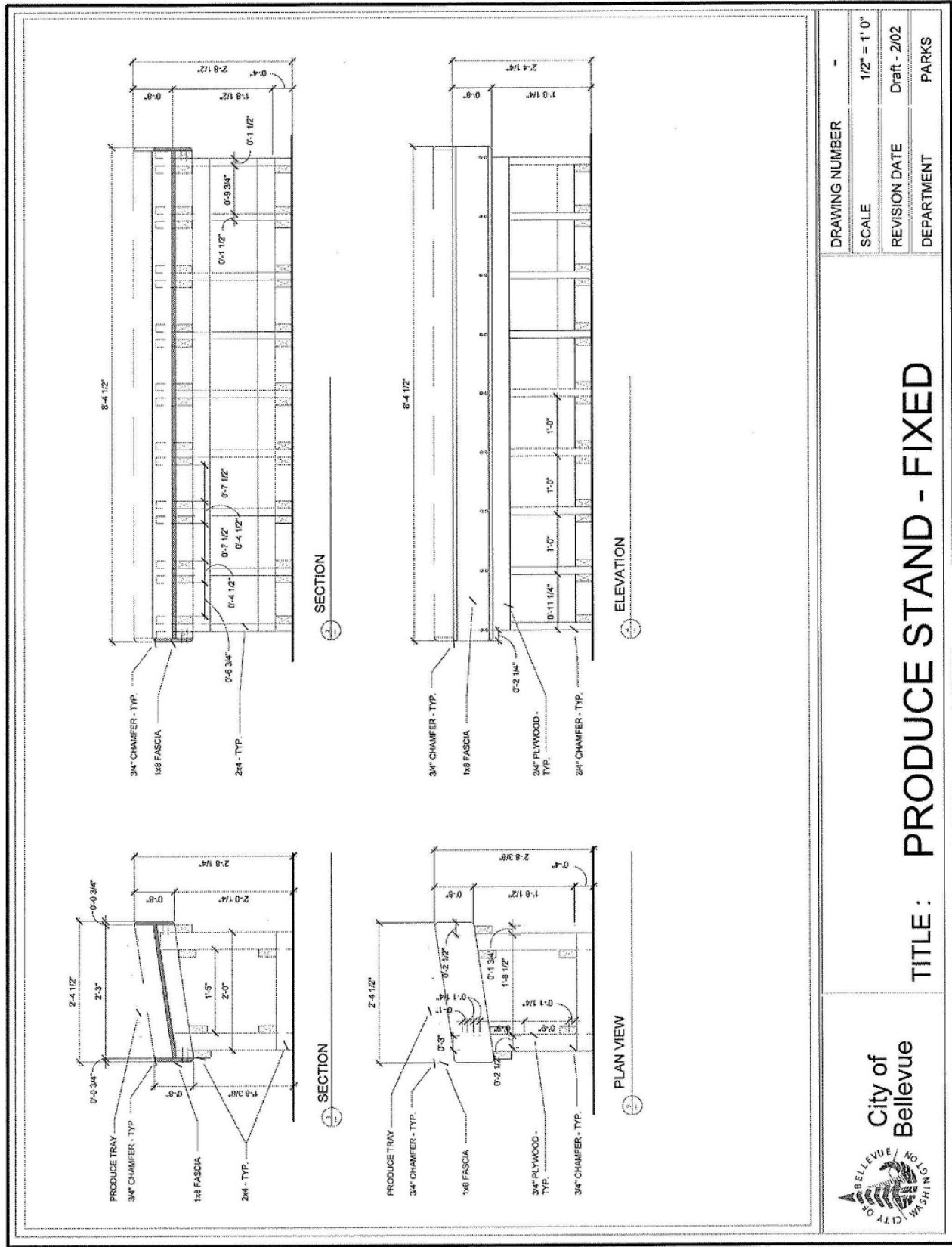




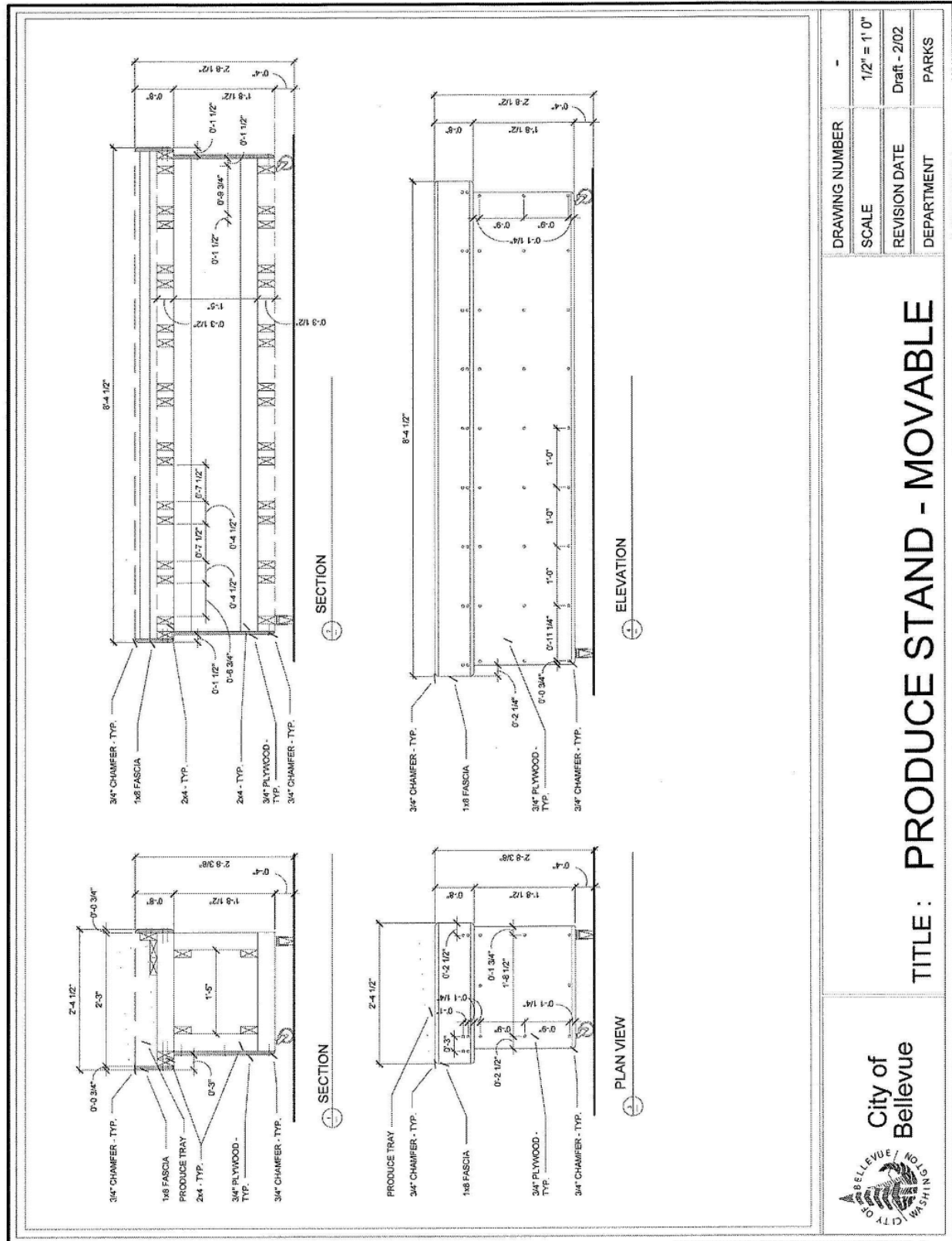




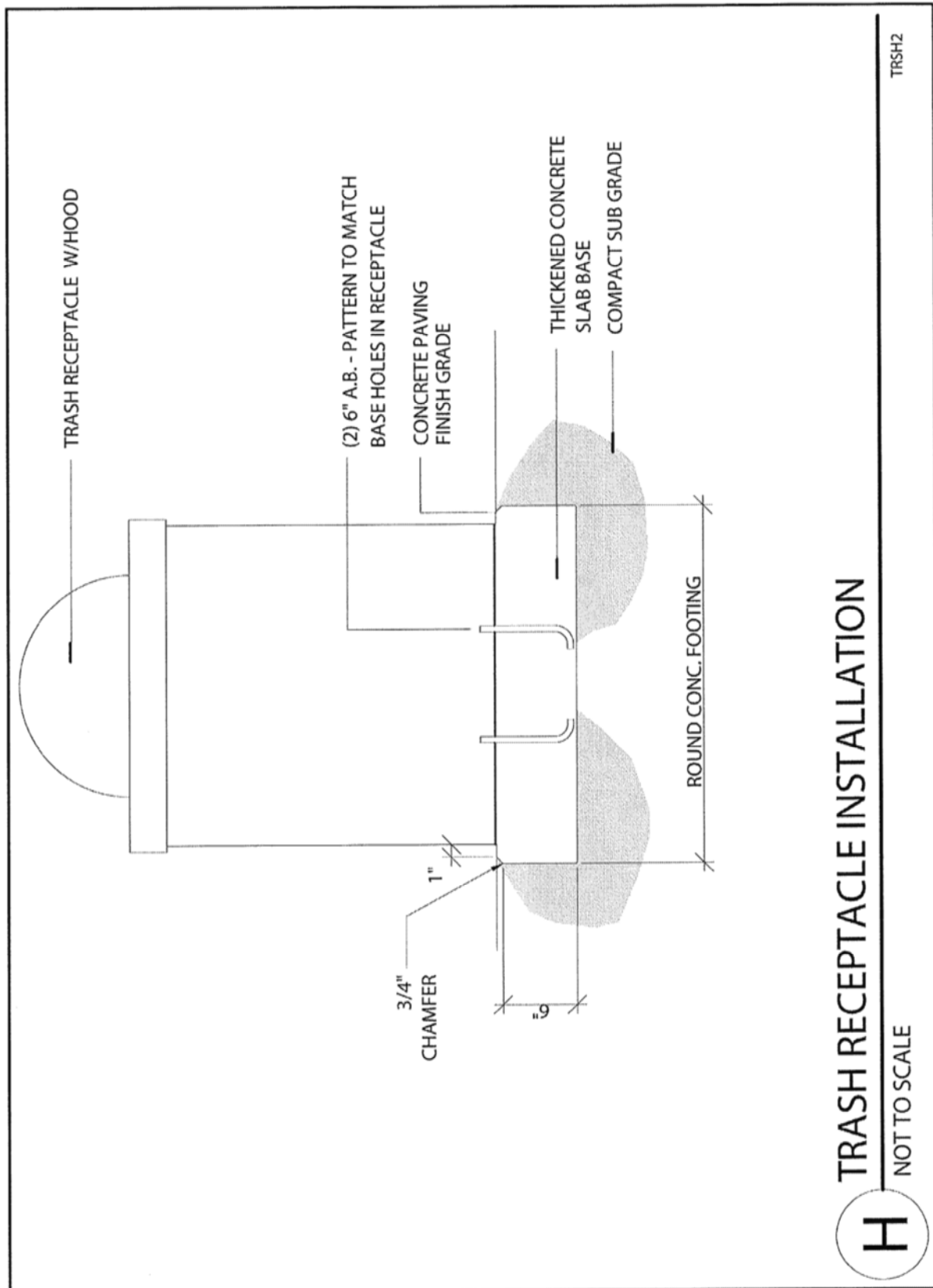


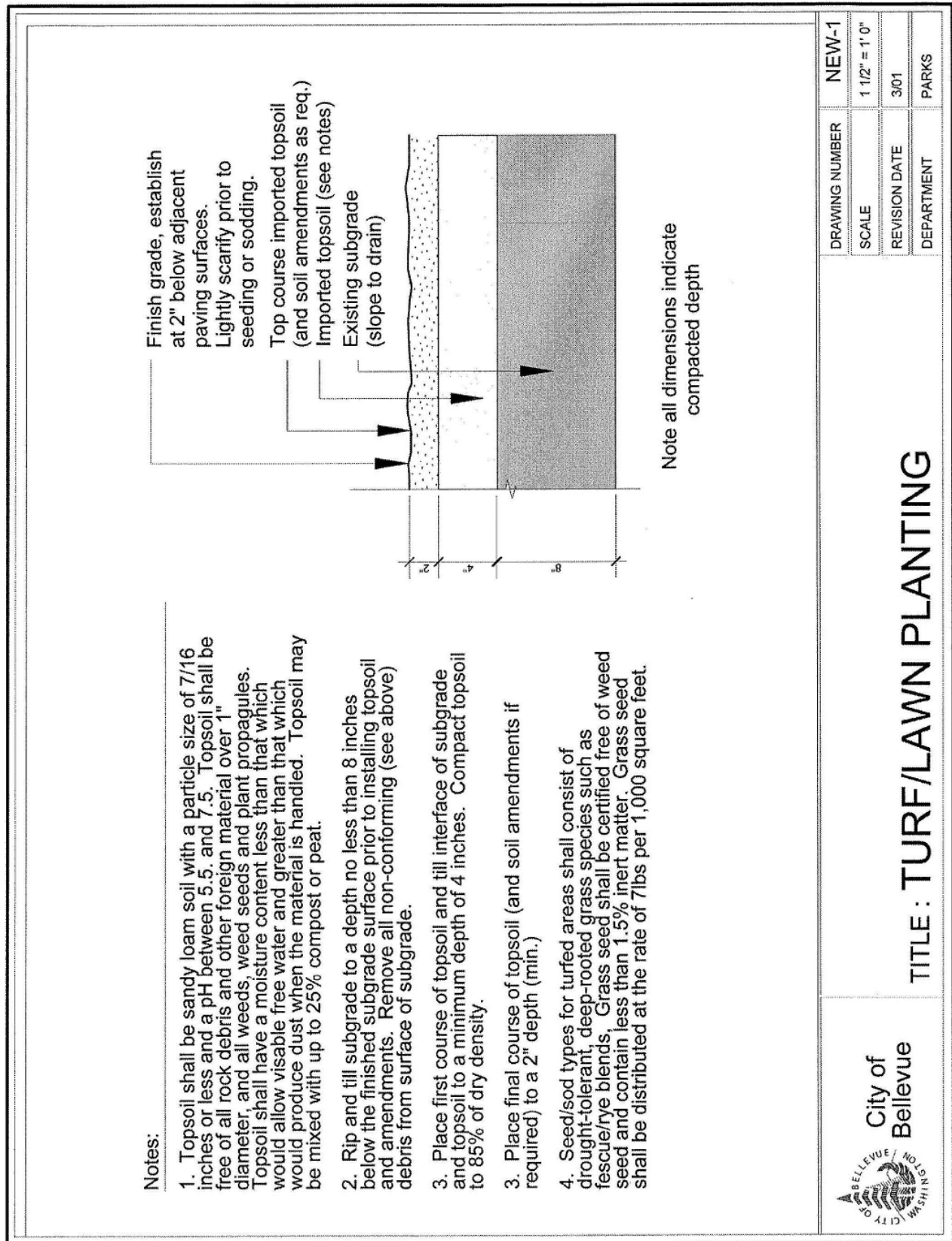




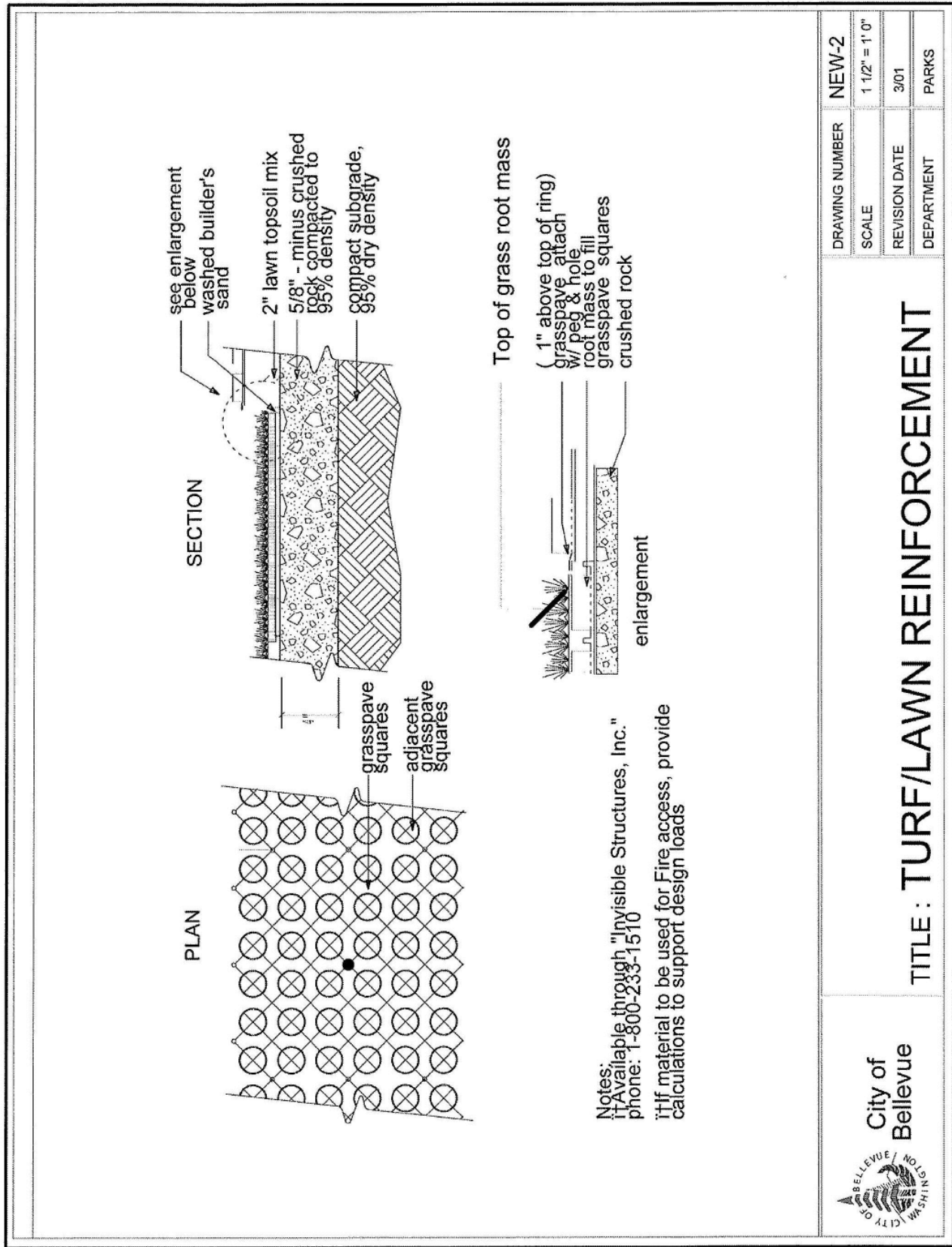


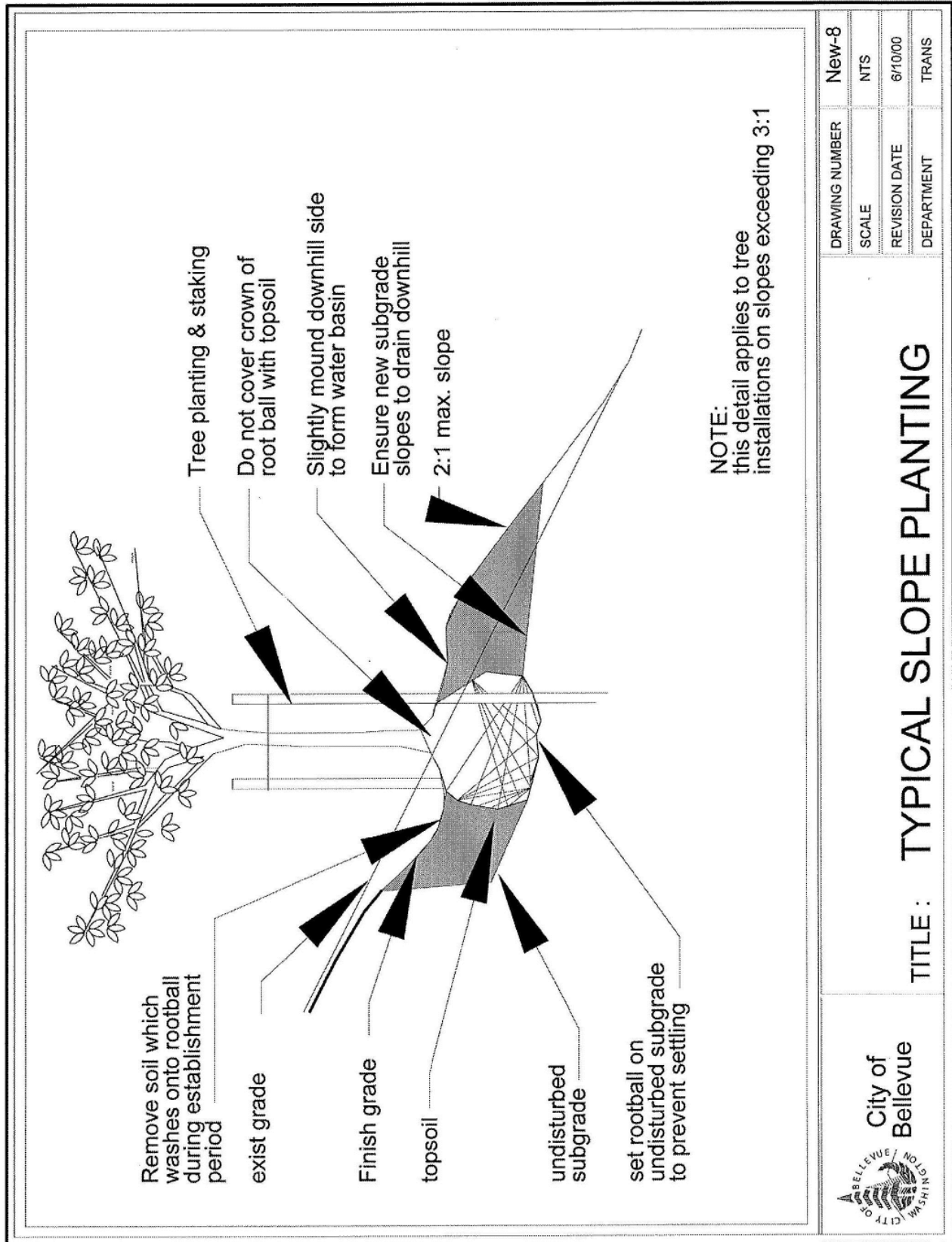
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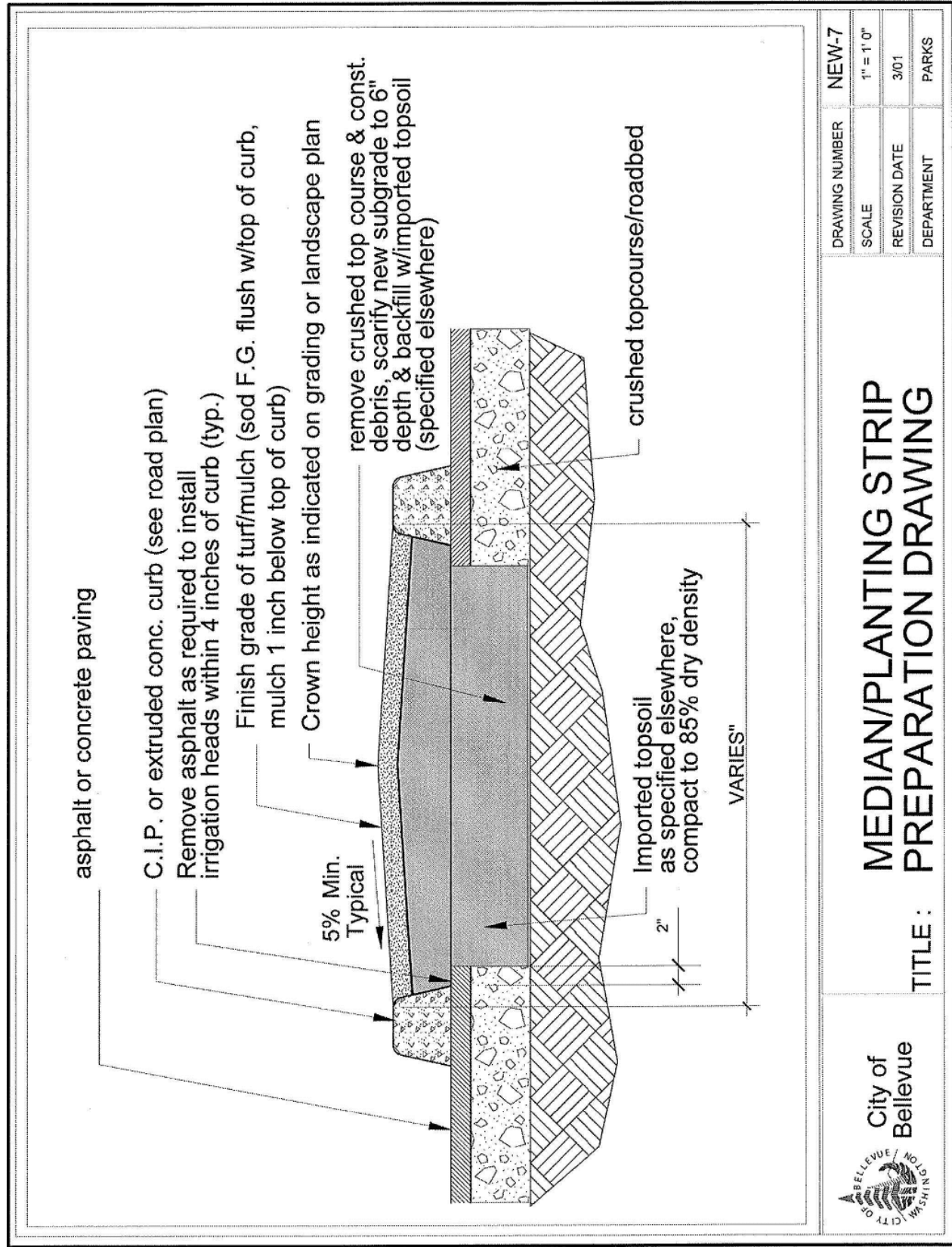












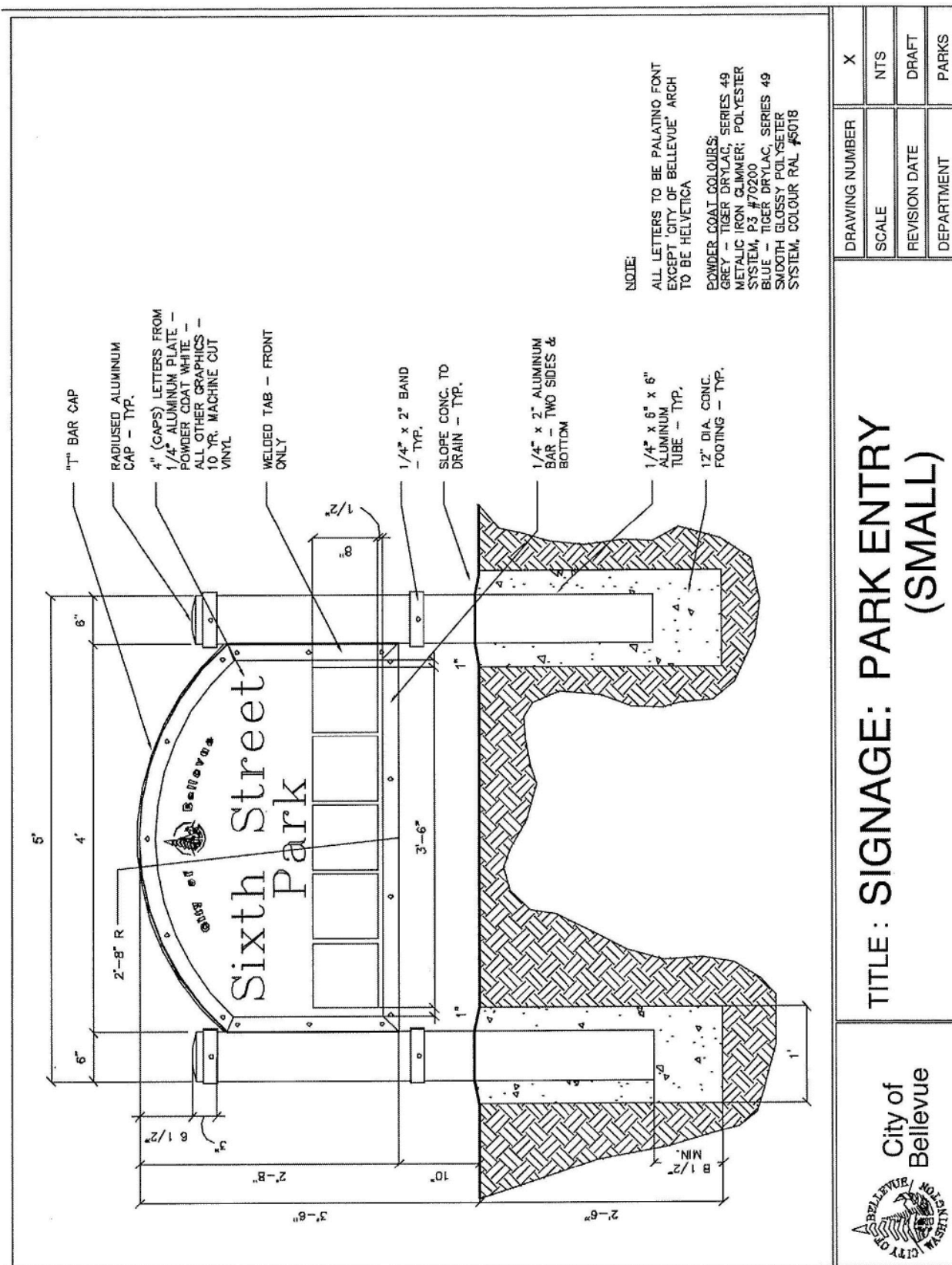
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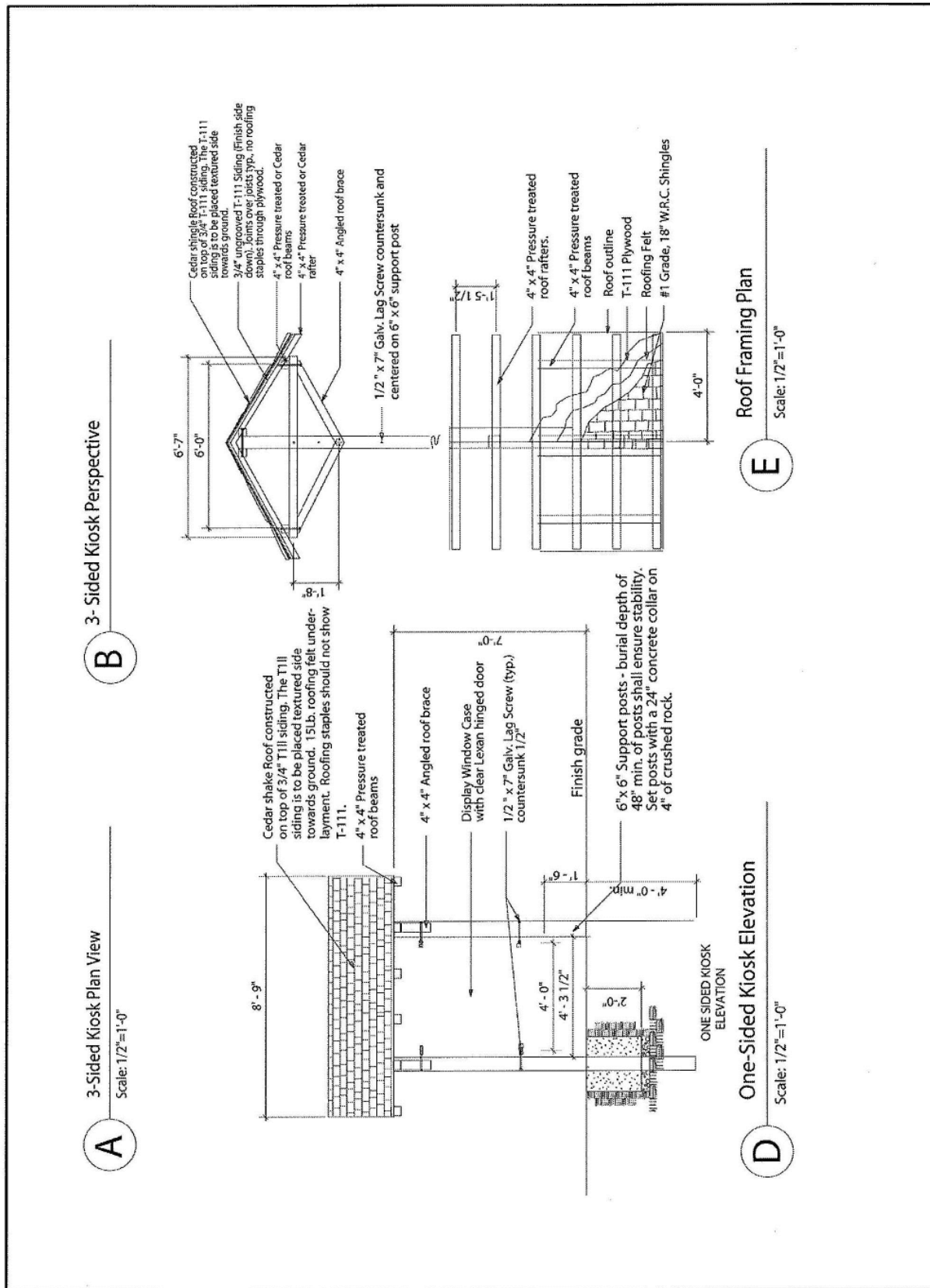
# MEDIAN/PLANTING STRIP PREPARATION DRAWING

TITLE:









# Workload Time Standards

Activity	Time Standard
<b>TURF:</b>	
Mowing	170 sq. ft./min.
Turf Trimming	50 ft./min.
Turf Edging	37 ft./min.
Weedeating Turf	105 ft./min.
Fertilize	45 ft./min.
Herbicide	45 ft./min.
<b>LANDSCAPE BEDS – TREES, SHRUBS &amp; GROUND COVER:</b>	
Hand Weeding	7 sq. ft./min.
Plant Trimming	7 ft./min.
Pruning	65 sq. ft./min.
Mulching Trees	2 min./tree
Watering Trees	5 min./tree
Mulching Beds	13 sq. ft./min.
Herbicide	45 ft./min.
<b>TRAILS:</b>	
Raking Trails	37 ft./min.
Resurfacing	1.2 ft./min.
Weedeating Edge	22 ft./min.
Weedeating Fence	78 ft./min.
Weedeating Trail	22 ft./min.
Trail Edge Pruning	207 ft./min.
Hedge Trimming	7 ft./min.
Sanding Bridges	13 ft./min.
Brush Hog	120 ft./min.
<b>OTHER:</b>	
Backpack Blowing	94 ft./min.
Walk-behind Blower	125 ft./min.
Parking Lot Sweeping	1 site/45 min.
Sign Maintenance	1.5 min/sign
Inspections	1 site/hr.



# Formal Park Workload Plan (example)

Activity													Total
Description	J	F	M	A	M	J	J	A	S	O	N	D	Frequency
TURF:													
Mowing			4	5	4	4	5	4	5	4			35
Rough Mow			2	2	2	2	2	2	2	2			16
Trimming			4	5	4	4	5	4	5	4			35
Edging			2	2	3	2	2	3	2	2			18
Fertilize				1		1		1		1			4
Sweeping	As Needed												-
Herbicide	As Needed												-
Renovation				1									1
Mole Control	As Needed												-
LANDSCAPE BEDS – TREES, SHRUBS & GROUNDCOVER:													
Weeding	1	1	3	5	4	4	5	4	5	2	1	1	36
Trimming GC				1		1		1		1			4
Pruning Trees										1			1
Pruning Shrubs				1		1			1		1		4
Herbicide	As Needed												-
Fertilize				1									1
Mulching		1											1
Natural Area Maint.			1					1					2
ANNUAL BEDS													
Color Install		1			1				1				3
Bulb Install									1				1
Fertilize					1		1		1				3
Grooming	2	2	2	4	4	4	4	4	4	4	2	2	38
OTHER:													
Blowing Hard Surf.	4	5	4	4	5	4	4	5	4	5	4	4	52
Irrigation Start-up			1										1
Irrigation Winterize										1			1
Irrigation Maint.			2	4	4	4	4	4	4				26
Trash Removal	4	5	4	4	5	4	4	5	4	5	4	4	52
Litter Pick-up	4	5	4	4	5	4	4	5	4	5	4	4	52
Leaf Removal										1	4	4	9
P-lot Sweeping	Weekly												52
Weeding Hard Surfaces	As Needed												-
Site Inspections	2	2	2	2	2	2	2	2	2	2	2	2	24



# Mini Park Workload Plan (example)

Activity Description	J	F	M	A	M	J	J	A	S	O	N	D	Total Frequency
<b>TURF:</b>													
Mowing			4	5	4	4	5	4	5	4			35
Rough Mow			2	2	2	2	2	2	2	2			16
Trimming			4	5	4	4	5	4	5	4			35
Edging			2	2	3	2	2	3	2	2			18
Fertilize				1		1		1		1			4
Sweeping													As Needed
Herbicide													As Needed
Renovation				1									1
Mole Control													As Needed
<b>LANDSCAPE BEDS – TREES, SHRUBS &amp; GROUNDCOVER:</b>													
Weeding	1	1	3	5	4	4	5	4	5	2	1	1	36
Trimming GC				1		1		1		1			4
Pruning Trees										1			1
Pruning Shrubs				1		1			1		1		4
Herbicide													As Needed
Fertilize				1									1
Mulching		1											1
<b>OTHER:</b>													
Blowing Hard Surf.	4	5	4	4	5	4	4	5	4	5	4	4	52
Irrigation Start-up			1										1
Irrigation Winterize										1			1
Irrigation Maint.			2	4	4	4	4	4	4				26
Trash Removal	4	5	4	4	5	4	4	5	4	5	4	4	52
Litter Pick-up	4	5	4	4	5	4	4	5	4	5	4	4	52
Leaf Removal										1	4	4	9
Weeding Hard Surfaces													As Needed
Site Inspections	2	2	2	2	2	2	2	2	2	2	2	2	24

# Streetscape Workload Plan (example)

Activity Description	J	F	M	A	M	J	J	A	S	O	N	D	Total Frequency
TURF:													
Mowing			4	5	4	4	5	4	5	4			35
Trimming			4	5	4	4	5	4	5	4			35
Edging			1	2	2	3	2	3	2	2	1		18
Fertilize			1				1			1			3
Herbicide	As Needed												-
TREES, SHRUBS & GROUNDCOVER:													
Weeding	1	1	3	5	4	4	5	4	5	2	1	1	36
Trimming GC				1		1		1		1			
Pruning Trees										1			1
Pruning Shrubs				1		1		1		1			4
Herbicide	As Needed												-
Mulching		1											1
OTHER:													
Blowing Hard Surf.	4	5	4	4	5	4	4	5	4	5	4	4	52
Irrigation Start-up			1										1
Irrigation Winterize										1			1
Irrigation Maint.			2	4	4	4	4	4	4				26
Litter Pick-up	4	5	4	4	5	4	4	5	4	5	4	4	52
Leaf Removal										1	4	4	9
Encroachment			1		1		1			1			4
Weeding Hard Surfaces	As Needed												-
Site Inspections	2	2	2	2	2	2	2	2	2	2	2	2	24



# Trails/Greenbelt Workload Plan (example)

Activity Description	J	F	M	A	M	J	J	A	S	O	N	D	Total Frequency
Weedeating Edge			1	1	2	2	2	1	1				10
Weedeating Fence			1	1	1	1	1	1	1				7
Weedeating Trail			2	2	2	2	2	2	1				13
Mowing			3	4	4	4	4	4	3				26
Edging			3	4	4	4	4	4	3				26
Hand Weeding	1	1	3	5	4	4	5	4	5	2	1	1	36
Fertilizing				1		1				1			3
Herbicide	As Needed												-
Trail Edge Pruning		1											1
Watering Trees						4	4	4	2				14
Mulching Trees			1										1
Mulching Beds			1										1
Sanding Bridges	1	1										1	3
Backpack Blowing	4	4	4	4	4	4	4	4	4	4	4	4	48
Walk-behind Blower			2	2	2	2	1			2	2	2	15
P-lot Sweeping	Weekly												52
Sign Maint.	1	1	1	1	1	1	1	1	1	1	1	1	12
Site Inspections	2	2	2	2	2	2	2	2	2	2	2	2	24

## Forest Enhancement/NGPA Workload Plan (example)

Activity Description	J	F	M	A	M	J	J	A	S	O	N	D	Total Frequency
Invasive Weed Removal			1	1	1	1	1	1	1				7
Herbicide	As Needed												-
Mowing	2	2	2	2	2	2	2	2	2	2	2	2	24
Watering						2	2	2	2	2			10

## City of Bellevue

# Water Shortage Contingency Plan

Bellevue's Utilities Department has a Water Shortage Contingency Plan (WSCP), which provides guidelines for the Utilities Department to manage water supply and demand in the event of a supply disruption. This plan addresses both progressive situations, such as those that are weather related and more drastic and immediate situations such as facility emergencies (for example, a water main break). The plan is designed to be flexibly applied according to the specific situation and includes communication actions, demand management actions, and supply alternatives.

## SECTION 1 (OVERVIEW)

### INTRODUCTION

Pursuant to the Water Utility Code (Chapter 24.02 of the Bellevue City Code), this Water Shortage Contingency Plan (hereafter WSCP) provides guidelines for the Bellevue Utilities Department (hereafter BUD) to manage water supply and demand within all areas supplied water by BUD in the event of a water supply disruption. The WSCP addresses progressive situations, such as those that are weather-related, and more drastic and immediate situations, such as facility emergencies, like a pipeline break. Pursuant to Sections 24.02.030 and 24.02.060 of the Water Utility Code, the BUD Water Shortage Team (hereafter WST, see Appendix "A" ) has primary responsibility for administering and implementing the WSCP.

The WSCP is designed to be used during highly unusual and infrequent events. The WSCP is intended to be implemented in coordination with the Seattle Public Utilities (hereafter SPU) Regional Water Shortage Contingency Plan (hereafter RWSCP) in the event of a regional supply disruption, or independently by BUD in the event of a local supply disruption.

This WSCP updates and replaces BUD's 1994 Water Shortage Contingency Plan. The WSCP will be reviewed and updated as necessary by January 31st of each year. The WSCP is Addendum "C" to the BUD Emergency Response Book and supplements the 1998 Water Comprehensive Plan.

### OBJECTIVE OF PLAN

The WSCP establishes actions and procedures for managing water supply and demands during water shortages. The primary objectives of the WSCP are to maintain essential public health and safety, and minimize adverse impacts on the economic activity, environmental resources, and quality of life within BUD's water service area.

## COORDINATION WITH OTHER EMERGENCY PLANNING



Implementation of the WSCP will be coordinated with the City's Emergency Operations Committee (hereafter EOC). The WST shall brief the EOC via the City's Emergency Preparedness Manager on the status of the following: water shortage, implementation of WSCP Stages, water use restrictions that are being implemented, and how restrictions may impact other City departments' operating activities.

### RELATIONSHIP TO RWSCP

BUD is responsible for administering a local WSCP. Because BUD, along with 25 other water purveyors, purchases water from the SPU regional supply system, any regional drought or emergency situation facing SPU will also affect BUD. SPU, together with BUD, its other wholesale purveyors, and other stakeholders, developed the RWSCP on the premise that an effective demand management strategy must be regionally consistent. This is based on several considerations:

- Public support and cooperation is likely to be higher if actions are equitable, i.e., all water users are experiencing the same service level and degree of hardship;
- Uniform messages and information are easier for the public to understand and easier to distribute through the media, which are key in communicating information to the public; and,
- Consistent demand management actions make it easier for SPU to forecast demand reductions, which is essential to effectively manage the system during a supply disruption.

### WSCP APPLICATION TO WHOLESALE SERVICE AREAS

The provisions of the WSCP apply to all areas and customers provided water by BUD pursuant to sections 24.02.030 and 24.02.050 (v) of the Water Utility Code. This includes but is not limited to all retail and wholesale customers and areas served by inter-local agreements, both within and outside Bellevue's city limits.

### COMPLIANCE WITH THE WATER CODE AND WSCP

Pursuant to section 24.02.200 (c) of the Water Utility Code, the waste of water is prohibited at all times. Further, pursuant to section 24.02.280 of the Water Utility Code, violations of the Code or restrictions in water use per the WSCP are subject to fines and penalties.

## SECTION 2 (DROUGHT MANAGEMENT STRATEGY)

### CAUSES OF WATER SUPPLY SHORTAGES

- Water supply disruptions can occur for a variety of reasons. A weather related water shortage, generally referred to as a drought, is one category of particular importance to SPU and BUD. Droughts are naturally occurring but unpredictable weather events of varying frequency, duration and severity. In the region served by the SPU regional water system, available data indicate a very low probability of a multi-year drought, but the region has experienced short-term droughts.

- The Puget Sound region, including Seattle and Bellevue, is generally faced with a relatively dry summer period. Only about 5 of our 38 – 40 inches of annual precipitation falls during the summer months. The SPU regional water system operates with an annual refill and drawdown cycle of its water supply storage reservoirs. Highly unusual weather events affect this cycle and can cause potential shortages. This can manifest in one or more of the following ways: Less than normal winter snow pack: limits the volume of instream flows available from snowmelt in the spring to fill Seattle's storage reservoirs for peak season demands.
- Unusually warm spring weather: causes early melting of the snow pack that results in early draw-down of the mountain reservoirs.
- Unusually warm and dry summer weather: significantly increases peak season demands and creates low flow conditions in streams tributary to the main-stem rivers.
- Delayed return of the fall rains or a dry winter: delays the fall reservoir refill cycle and creates extended low flow conditions in the streams and rivers.
- The specific cause and timing of any supply disruption will affect the direction, level and timing of SPU's and/or BUD's response. One critical consideration in managing water supply and demand when there is a potential water shortage is stream flow levels. In addition to meeting the needs of SPU's retail and wholesale customers, the Cedar and South Fork Tolt rivers are managed to meet instream flow needs for fish and wildlife habitat. Water is released from SPU's regional storage reservoirs to augment and provide adequate instream flows for salmon and other species downstream particularly during periods of weather-induced low stream flow conditions and drought. Additionally, the Cedar River provides approximately half of the inflow tributary to Lake Washington on an annual average basis. The U.S. Army Corps of Engineers manages Lake Washington lake levels as part of its Lake Washington Ship Canal Project, which connects Lake Washington to Puget Sound. Their management objectives include providing water flows at the Hiram Chittenden Locks for navigation, fish passage and control of the salt water intrusion caused by operation of the Locks.

## STRATEGY

SPU's strategy for managing a drought and potential regional water shortage involves several components:

- **Information** – To deal with hydrologic uncertainty in real-time and in long-term planning horizons, SPU's water management team uses a number of available informational and data gathering sources. SPU contracts with the U.S. Geological Survey (USGS) to provide stream flow monitoring and data collection services. Strategic placement of USGS stream gauging stations provides real-time information for understanding the hydrologic state of the water supply and river systems. SPU also contracts with the Natural Resources Conservation Service (NRCS) to provide snow monitoring and data collection services. SPU's regional water supply relies heavily on the water stored as snow in its mountain watersheds. Quantifying the snow conditions

in our watersheds is an important activity during the winter and spring months as reservoir management and downstream flow release decisions are made.

- **Forecasting** – Through the National Oceanic and Atmospheric Administration (NOAA), SPU regularly monitors daily weather forecasts (National Weather Service Seattle Forecasting Office), mid-range weather forecasts (Climate Prediction Center), 30- and 90-day and multi-season climate outlooks (Climate Prediction Center), and daily hydro-meteorological forecasts (Northwest River Forecast Center in Portland, Oregon). The internet has greatly improved access to these sources of information. For example, NOAA's El Niño Theme Page on the internet provides a wealth of timely information on current and forecasted El Niño and La Niña conditions with enough lead time for water resource managers to prepare for such events. SPU uses a number of analytical tools for forecasting hydrologic conditions as they relate to water supply and fisheries including: Stream flow forecasts prepared by the USGS and NRCS; Weather, climate and river forecasts from NOAA; A reservoir management and stream flow forecasting computer model known as the Seattle Forecast Model, or SEAFM. This model is regularly updated with hourly meteorological and hydrological data, and it simulates the current state of the watershed (including snow pack, soil moisture, aquifer storage and stream flows) and water supply system. The model is used to analyze and assess various future reservoir operating scenarios, both in real time and in near and long-term operational planning, based on probabilistic analysis of over 65 years of historic weather; and Seattle Water Allocation Network (SWAN) model and the Conjunctive Use Evaluation (CUE) model, which are weekly time step simulation models used for calculating and evaluating the firm yield and reliability of Seattle's water supply system and potential future water supply projects. While not forecast tools per se, these models provide valuable insight into the hydrologic record.
- **Communication** – SPU's water management team works closely with members of other local, state, federal and tribal resource agencies including Seattle City Light, City of Renton, King County, Washington State Department of Ecology, Washington State Department of Fish and Wildlife, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, National Marine Fisheries Services, Muckleshoot Indian Tribe and Tulalip Tribes. Agency conference calls are typically scheduled once a month to discuss hydrologic conditions, facility and system operations (water supply, hydropower, and Ship Canal), fish biology and ecology, and other subjects as may be beneficial in implementing instream flow plans for the lower Cedar and the South Fork Tolt rivers. When needed, such as during a drought, these conference calls occur more frequently. SPU has ongoing formal and informal agreements with resource agencies, Indian Tribes and the U.S. Army Corps of Engineers in how it manages the stream flow levels. These formal and informal agreements affect SPU's ability to manage the water supply when there is a potential shortage, as the needs of customers must be balanced with the needs of fish. Both the Tolt FERC Settlement Agreement and the Instream Flow Agreement for the Cedar River include management provisions and requirements for situations in which normal instream flows cannot be maintained.



- **Dynamic Operating Rules** – Operational flexibility is key, with operating plans changing as conditions and forecasts change. Dynamic reservoir rule curves must be used since these can better reflect watershed conditions and allow risk and uncertainty to be managed. A key assumption is that abundance, shortage and risk must be shared among all beneficiaries of the region's water resources. For example, critical minimum instream flow levels at locations specified in the Tolt and Cedar agreements referenced above are resorted to only after human water consumption is curtailed. All of the tools, information sources and communications outlined above are needed for coordinating and decision making related to real-time operations.

## **REGIONAL DROUGHT EXPERIENCES**

The SPU's regional water system (and BUD) has experienced two very different types of droughts in recent history. In 1987, storage reservoirs were at normal levels on June 1, but the summer weather was unusually warm and dry. Higher than normal outdoor water use accelerated the draw-down of the storage reservoirs. To reduce demand, in early August lawn watering was restricted to no more than once every three days and customers were urged to voluntarily curtail other water uses. These actions reduced demand by approximately 10 percent. In early fall, an emergency pumping station was installed at the Chester Morse Lake reservoir to pump "dead storage" should the reservoir level fall below the lake's natural outlet. Throughout the fall, precipitation continued below normal. The water supply system was managed and adjusted to obtain the maximum supply available (e.g., relying on Lake Youngs more than normal). In November and January 1988, the Chester Morse reservoir was low enough to require pumping and it wasn't until February 1988 that precipitation returned to normal and began refilling the storage reservoirs.

In 1992, the system experienced a different type of drought. The winter was unusually warm, and snow pack and instream flows into the storage reservoirs were at record low levels. In late February it was evident that there was insufficient snow pack to fill the storage reservoirs and that the likelihood of recovery by June 1 due to rainfall was minimal. A number of measures were taken to maximize available supply (e.g., reducing system flushing, adjusting stream flow levels, etc.) and to reduce demand.

In May, a number of mandatory water use restrictions were implemented in the SPU regional service area (including BUD). Mandatory restrictions, including a ban on lawn watering, resulted in an average regional consumption reduction of 25 to 30 percent below normal throughout the summer. In BUD's service area, average consumption decreased between 35 and 45 percent during the summer. Tribes, state resource agencies and the Army Corps of Engineers played a significant role in cooperating to maximize available water supply. In addition, other measures were taken by SPU to increase available supply, including initiating an intertie with Renton and accelerating the construction of a second pump plant for the Chester Morse Reservoir. The mandatory restrictions were rescinded in September as supply levels returned to normal with the onset of fall rains.

In 1997-98, one of the most significant El Nino weather events on record concerned SPU and its wholesale water purveyors regarding potential effects of this winter-warming phenomenon on snow pack, and consequently on water supply. SPU, together with BUD, SPU's other wholesale customers, and other stakeholders revisited the RWSCP to ensure readiness in case of significant El Nino effects and took initial steps to prepare. Though a water shortage did not occur, this event resulted in several changes being made to the RWSCP and to BUD's WSCP. Based upon experiences from the three water shortages, the following principles have been developed and incorporated into SPU's RWSCP and BUD's WSCP. These principles are articulated as follows: Given clear, timely and specific information on supply conditions and the necessary actions to forestall worsening conditions, customers prefer the opportunity to meet targeted demand reduction levels through voluntary compliance measures. The decision to move to mandatory restrictions is more acceptable if the voluntary approach has been tried first but has not resulted in enough demand reduction to ensure public health, safety and adequate stream flows through the projected duration of the shortage.

Each drought or other shortage situation has enough unique characteristics that a plan cannot specifically define all the scenarios and specific supply and demand management actions that may be needed or implemented. The usefulness of a WSCP lies in planning the range of supply and demand management actions in advance of the situation, and in defining the communication mechanisms by which decisions will be made during the event.

Given the effective conservation programs operated by SPU, BUD and other purveyors in the region since 1990, it is important to distinguish between curtailment and conservation. Conservation measures focus on long-term and lasting efficiencies that do not affect the quality of life. Curtailment measures focus on short-term, temporary actions that may impact quality of life.

It is essential to closely monitor water quality during a supply disruption, particularly during a warm weather drought. Water quality issues must be considered when supply management decisions are made.

### ALTERNATIVE WATER SUPPLIES

Depending on the nature and timing of a potential water shortage, the following alternative water supplies may be useful to supplement existing supplies:

**Interties** – Since water supply disruptions will not affect all water suppliers to the same extent, it is sometimes feasible for SPU and/or BUD to obtain water from other providers through interties, where they exist.

**Chester Morse Lake "Dead Storage"** – SPU's primary storage reservoir has a natural, gravity-fed outlet. When inflows are low the reservoir can fall below the natural rim but still contain a substantial amount of high quality water. In 1992 SPU installed emergency pump stations to pump the water over the natural outlet and into the river, thereby augmenting both instream flows and water availability for customer use had the drought continued into fall or beyond. In

granting the water right for this use, the Department of Ecology conditioned it with the following language:

". . . Use of the temporary pumping plants is allowed only during water shortages due to unusual or extreme conditions and after the Seattle Water Department [ed. note: SPU] is implementing elements of its Water Shortage Contingency Plan . . ."

**Reclaimed Water** – Using highly treated effluent instead of potable water for irrigation, street washing, construction purposes, etc. can reduce demand for potable water and lessen the impact of the shortage on the community. While high quality reclaimed water can be produced by King County at one or more of its wastewater treatment plants, issues include obtaining permits to use this water and obtaining and distributing adequate amounts to decrease potable water demands. These issues – availability, permitting and distribution – are likely to change in future years and should be revisited in the event of any future water shortage.

## SECTION 3 (PHASED CURTAILMENT PLAN)

### STAGES OF PHASED CURTAILMENT

The WSCP provides four stages of response, which increase in severity as progressively more serious conditions warrant. This type of staged response would be appropriate to a regional summer drought or other long range disruption, and would in nearly all instances be coordinated with the RWSCP. Each of the four stages includes a variety of communications, internal operations, and supply and demand management strategies as appropriate. The stages are characterized as follows:

**Advisory Stage** – The public is informed as early as meaningful data is available that the potential for a future water shortage exists.

**Voluntary Stage** – If supply conditions worsen, the Plan moves to the Voluntary Stage, which relies on the voluntary cooperation and support of customers to meet targeted demand reduction goals. During this stage, specific voluntary actions are suggested for both residential and commercial customers. Surcharges may also be implemented.

**Mandatory Stage** – If the Voluntary Stage does not result in the reduction needed, or supply conditions worsen, the Mandatory Stage prohibits or restricts certain water uses. This stage would be accompanied by an enforcement plan that could include fines for repeated violations. Surcharges may also be implemented.

**Emergency Curtailment Stage** – The Emergency Curtailment Stage addresses the most severe need for demand reduction. This stage could include an extensive combination of severe water use restrictions, prohibitions and rate surcharges. This would be used as the last stage of a progressive situation, such as a drought of increasing severity, or to address an immediate crisis, such as a system failure.

Recommendations about implementing the RWSCP would be made to the SPU Director by the SPU Shortage Advisory Group (hereafter SPUSAG; see Appendix "A"). This group, involving SPU



department staff and purveyor representatives, will consider the following factors in making its recommendations:

- Total supply availability, including groundwater, interties and modified instream flow releases.
- The rate of decline in total reservoir storage compared with the normal operating rule curve.
- Short and long-term weather forecasts by the NOAA National Weather Service.
- Computer modeling of stream flow, weather and demand assumption data.
- The trends and forecasts of the system's daily water demands.
- The estimated margin of safety provided by the demand reduction, compared with the level of risk assumed if no action is taken.
- The value of lost water sales revenue compared with the increased margin of reliability.
- Consultation with elected officials, purveyor representatives, state resource agencies, the Army Corps of Engineers and Tribes.
- The length of time between stage changes (abrupt starts and stops are to be avoided), and required time to shift administrative gears and prepare to implement progressive stages of phased curtailment.
- Current events.
- Customer response.

BUD would implement its WSCP when it is notified by SPU that the RWSCP is being implemented, or at such time that a local emergency requires implementation of the WSCP at the local level as determined by the BUD-WST.

## 1. ADVISORY STAGE

### OBJECTIVES:

To prepare BUD, the City of Bellevue, relevant agencies and water customers for a potential water shortage thereby allowing all parties adequate planning and coordination time. To undertake supply management actions in cooperation with SPU that forestall or minimize the need later for more stringent demand or supply management actions.

### TRIGGERS:

There are a variety of weather and other conditions that may cause concern about water availability and a potential water shortage. Two primary conditions that would trigger regional implementation of the Advisory Stage by SPU, BUD and other SPU purveyors, are: Total reservoir storage is not projected to be at standard operating capacity as of June 1, due to exceptionally low snow pack, precipitation and/or lack of carryover storage from previous year; Total reservoir storage and predicted inflows are significantly below historical norms for the current time of year, and supply modeling indicates that expected demands may not be met if this trend continues or worsens.

The Advisory Stage is withdrawn when projected reservoir storage trends improve to normal water supply conditions.

**PUBLIC MESSAGE:**

"The potential exists for lower than normal water supply. Conditions may return to normal; however, if water supply conditions do not improve, we may need to reduce consumption at a later date. We'll continue to keep you informed."

**ADVISORY STAGE ACTIONS****SPU & SPUSAG COMMUNICATION ACTIONS:**

- Brief Purveyors on water shortage advisory and implementation of the Advisory Stage of the RWSCP.
- Provide regional public information regarding supply conditions and potential for a water shortage.

**BUD COMMUNICATION ACTION:**

- Convene and brief BUD-WST (Appendix A).
- Brief City Leadership Team, Emergency Preparedness Manager and Public Information Officer (Appendix B).
- Brief elected officials (Appendix B).
- Brief Environmental Services Commission (see Appendix B).
- Brief City Employees (Appendix B).
- Provide Advisory Stage information to all BUD administrative staff, Utility Billing account representatives and City Information Desk.
- Provide local support of SPU's public information and education efforts about the water supply system, particularly concerning relationship of weather to supply and demand. Provide up to date local water use data and demand implications, as known. Coordinate with SPU to provide SPU Water Supply Status Report information to entities with special interests (Appendix "C" e.g., large water users, especially landscape and nursery industry, parks, major water using industries).
- Coordinate preparation and distribution of public information materials, explaining the WSCP stages and range of actions with Seattle Public Utilities; prepare "Question and Answers" for people planning new landscaping.

**BUD INTERNAL OPERATING ACTIONS:**

- Intensify data collection actions (local water consumption, regional supply status) and monitoring weather and SPU supply forecasts.
- Increase monitoring of purveyor "hotline", a frequently updated recording providing latest information and supply and demand data.
- Assess scheduled water main flushing and reservoir cleaning activities. Be consistent with regional decision to either accelerate so they are completed prior to the peak season or to reduce activities to conserve supply.
- Assess water quality in reservoirs and distribution system to target for correction areas predicted to experience severe degradation due to reduced consumption.
- Initiate planning and preparation for Voluntary Stage actions.

### BUD SUPPLY AND DEMAND MANAGEMENT ACTIONS:

- None in the Advisory Stage

## 2. VOLUNTARY STAGE

### OBJECTIVES:

- Maintain or reduce demand to targeted demand reduction goals through voluntary actions by customers.
- Forestall or minimize need later for more stringent demand or supply management actions.
- Minimize the disruption to customers' lives and businesses while meeting targeted demand reduction goals.
- Maintain high water quality standards throughout the water shortage.

### TRIGGERS:

The "Voluntary Stage" is implemented when one or both of the following factors applies:

- Supply conditions identified in the Advisory Stage have not improved or have worsened.
- Demand levels indicate the need for a more systematic response to manage the situation.

The SPU regional water system and BUD's local water system are designed to carry large capacities of water during the summer peak months. Significantly lowered water demand during a drought, coupled with higher summer temperatures, increases the potential for water quality problems. Consideration will be given to potential water quality issues in defining the supply and demand management strategies at the regional level by SPU and at the local level by BUD.

### PUBLIC MESSAGE:

"We are relying on the support and cooperation of all water users to conserve the available water supply. Demand needs to be reduced by \_\_\_\_% (to be determined). Customers are responsible for determining how they will meet this goal. Water waste is not allowed. If everyone cooperates, we may avoid imposing more stringent restrictions at a later date. In addition to meeting the essential water needs of customers, meeting the needs of fish and other environmental concerns is a priority."

## 3. VOLUNTARY STAGE ACTIONS

### SPU & SPUSAG COMMUNICATION ACTIONS:

SPUSAG will meet frequently to re-evaluate the water supply situation based on current and projected supply conditions, weather forecasts, and the season to determine appropriate actions and strategies. The group will determine target consumption goals to be achieved on a voluntary basis, which may be revised as necessary, and will advise Purveyors (Appendix D)



regarding targeted goals for consumption reductions. Based on the consumption goal, some or all of the Voluntary Measures (Appendix E) will be requested. SPU and SPUSAG will:

- Establish systematic communications with Seattle elected officials; SPU Director and SPUSAG communicates the Voluntary Stage Demand Reduction Goals, the nature and scope of voluntary measures, and the voluntary curtailment strategy to the Seattle Mayor and Council, purveyors, tribes and resource agencies.
- Evaluate whether targeted consumption levels and supply conditions warrant a rate surcharge to reinforce voluntary actions and/or to recover revenue losses. SPU Director makes recommendation to Mayor and Council.
- SPUSAG informs Purveyors of move into Voluntary Stage and of any surcharges.

#### **BUD COMMUNICATION ACTIONS:**

- Establish systematic communications with Mayor and City Council; City Leadership Team, Emergency Preparedness Officer and City Public Information Officer; Environmental Services Commission; and, City employees (Appendix B).
- Concurrent with SPU actions, prepare Declaration of Water Shortage Emergency for the City Manager to sign and public notice materials for appropriate local media.
- Prepare Mandatory Water Use Restrictions and/or Surcharges for BUD Director's consideration and approval. Request that highly visible City Departments (e.g. Utilities, Transportation and Parks) set a public example by doing more than the minimum voluntary actions. Request curtailment plan from Parks.
- Establish systematic communication to keep BUD staff (especially phone coverage staff), Utility Billing representatives, O&M staff and City Information Desk up to date on goals, conditions and actions.
- Consult with local customer groups to target public information messages and materials, and to obtain feedback on utility actions (Appendix C).
- As appropriate, support SPU's regional public information, media and advertising campaigns and supplement through Bellevue's local outreach communication channels.
- Establish routine timing for press releases that provide current status and outlook; present information in standardized format that becomes familiar to local media and public.
- Publish and promote regional consumption graph that displays the goal and previous 24 hour consumption in local newspapers.
- Promote consumption goals for typical households, and a percentage reduction goal for commercial customers.
- Support development and implementation of regional and local communications and marketing plans promoting voluntary curtailment, including paid advertising to inform customers about supply and demand conditions; recommends customer actions to reduce demand sufficiently (per Appendix E). Depending on conditions, remind customers that if goals are not achieved, restrictions may be necessary.
- Include water quality information in public information so that if flushing is necessary, the public understands that it is essential for water quality maintenance.

- Publicize the water supply conditions on BTV and Department web page (with regular updates). Ensure information provided covers the needs of all key stakeholders: the public, news media and purveyors.
- Identify and promote reduced evapotranspiration (ET) rate for large irrigators.
- Establish a "BUD Water Shortage Hotline" for customers to obtain additional conservation information.
- Contact largest customers to request percentage reduction. Contact other City Departments and public agencies to inform them of conditions and request their cooperation.
- Prepare list of and promote commercial car wash facilities that recycle water.
- Print generic postcards to acknowledge receipt of customer correspondence regarding the shortage and to inform customer that specific response is being prepared.

### BUD INTERNAL OPERATING ACTIONS:

- Continue actions listed in the Advisory Stage.
- Eliminate system operation water uses determined not to be essential to maintain water quality such as pipeline flushing; complete cleaning of any in-town reservoirs known to be vulnerable to warm weather taste and odor concerns.
- Increase water quality monitoring actions.
- Implement staff reassignments as needed.
- Identify the potential "next steps needed to reduce demand" including timing, what type of restrictions, and/or surcharges to be imposed.
- Initiate remaining planning and preparation for Mandatory Stage, including staffing changes that may be needed for the Mandatory Stage to enforce mandatory restrictions.

### BUD SUPPLY AND DEMAND MANAGEMENT ACTIONS:

- Request that non-recirculating fountains be turned off (Appendix C).
- Request that Fire Department limit training exercises that use water.
- Request that the City, Bellevue School District and other large fleet agencies eliminate washing fleet vehicles unless recycling car washes are used.
- Request that water washing of City sidewalks, driveways, parking lots, etc. be limited to situations that require it for public health and safety.
- Have BUD field personnel "tag" observed obvious water waste, such as hoses without shutoff nozzles, gutter flooding, etc. with notice that informs customer about the supply conditions and need to conserve.
- Together with SPU, evaluate ability to accelerate, enhance, or expand long-term conservation programs; implement as appropriate.

## 4. MANDATORY STAGE

### OBJECTIVES:

- Achieve targeted demand reduction goals by restricting or prohibiting defined water uses.

- Ensure adequate water supply will be available during the duration of the water shortage to protect public health and safety, and to balance the need for stream flows for fish habitat.
- Minimize disruption to customers' lives and businesses, to the extent practical, while meeting target demand reduction goals.
- Maintain high water quality standards throughout the shortage.
- Promote equity amongst customers by establishing clear restrictions that affect all customers.

**TRIGGERS:**

Progression to the Mandatory Stage occurs when:

- Goals established in the "Voluntary Stage" have not been met and additional action is needed.
- Supply conditions worsen despite voluntary measures.
- Specific restrictions imposed during the mandatory stage would be determined based on the season of the year, targeted demand reduction goals and other considerations previously mentioned. Variations of specific restrictions may be applied based on water supply conditions. For example, lawn watering restrictions may simply consist of time of day restrictions; or if conditions warrant, lawn watering could be restricted to certain times of day and allowed only once a week; or lawn watering could be entirely restricted.

**PUBLIC MESSAGE:**

"It is necessary to impose mandatory restrictions to reduce demand because the voluntary approach has not resulted in the necessary savings (or supply conditions have worsened despite the public's best efforts). We are continuing to rely on the support and cooperation of the public to comply with these restrictions but need the certainty and predictability of restricting certain water uses to ensure that throughout the duration of this shortage an adequate supply of water is maintained for public health and safety."

**MANDATORY STAGE ACTIONS:****SPU & SPUSAG COMMUNICATION ACTIONS**

- SPUSAG recommends nature, scope and timing of restrictions to SPU's Director. SPU's Director of Water Quality and Supply determines that water supply and demand management strategies will not result in unacceptable water quality degradation. SPU's Director recommends Mandatory Stage and water use restrictions to the Seattle Mayor and City Council. Seattle City Council adopts legislation on mandatory restrictions and, if needed and not already in place, emergency surcharges.
- The SPUSAG informs Purveyors of implementation of the Mandatory Stage; the nature, scope and timing of mandatory restrictions; and of emergency surcharges if implemented.

**BUD COMMUNICATION ACTIONS**



- Brief Mayor and City Council; Leadership Team, City Emergency Preparedness Manager, and City Public Information Officer; Environmental Services Commission; and City employees (Appendix B) regarding water shortage status, the move into the Mandatory Stage, and water restrictions, and/or surcharges if implemented.
- Concurrent with SPU actions, prepare Declaration of Water Shortage Emergency for the City Manager to sign and public notice materials for appropriate local media.
- Prepare Mandatory Water Use Restrictions and/or Surcharges for BUD Director's consideration and approval. Request that highly visible City Departments (e.g. Utilities, Transportation, and Parks) set strong public example and do more than meet minimum water use restrictions. Request curtailment plan from Parks.
- Inform public about the nature and scope of the mandatory restrictions through a press conference, paid advertising and other means, including direct mail. Information will address enforcement mechanisms, rate surcharges, target consumption goals, projected duration of restrictions and reasons for imposing restrictions, the possible consequences if targeted demand reduction goals are not met. Exemptions from restrictions, if any, will be clearly identified.
- In communicating mandatory restrictions to the public, a clear distinction will be made between lawn/turf watering and watering gardens and ornamental plantings. The type and amount of watering allowed will be clearly defined.
- The BUD "Water Shortage Hotline" will be set up to receive reports of violations of restrictions.
- Customers who irrigate with private wells will be urged to install signs to let the public know that private well water is being used.
- Communication actions from the Advisory and Voluntary stages will be continued and enhanced.

### BUD INTERNAL OPERATING ACTIONS:

- Continue appropriate actions from previous stages.
- If appropriate, implement procedures for exemptions from restrictions and/or emergency surcharges.
- Implement Enforcement Procedures for Mandatory Water Use Restrictions, including highly visible "Water Watchers" (Appendix "F").
- Increase water quality monitoring actions.
- Begin plans and preparations to move into the Emergency Curtailment Stage, including staffing re-assignments and mobilization of the EOC & EOB.

### BUD SUPPLY AND DEMAND MANAGEMENT ACTIONS:

- Overall supply conditions will be considered by SPUSAG and BUD-WST to determine specific restrictions to impose. Some, but not all, options for water use restrictions, depending upon how much demand reduction is necessary to maintain essential water service levels for public health and safety, are listed below.
- Prohibit use of any ornamental fountain using drinking water for operation or make-up.
- Prohibit car washing except at commercial car wash facilities that recycle water.

- Rescind all Hydrant Use Permits.
- Prohibit washing of sidewalks, streets, decks or driveways except as necessary for public health and safety.
- Limit pressure-washing of buildings to situations that require it as part of scheduled building rehabilitation project (e.g., painting), or prohibit entirely if necessary.
- Prohibit water waste including untended hoses without shut-off nozzles, obvious leaks, and water running to waste such as gutter flooding and sprinklers or irrigation systems whose spray pattern unnecessarily and significantly hits paved areas.
- Prohibit all landscape and garden watering during the warmest hours of the day. For example: No Watering Between 10:00 a.m. and 7:00 p.m.
- Limit all landscape and garden watering to a specific number of days per week or per month. This option will depend on target consumption goals, the time of year, the extent to which watering is occurring, and how much demands have already decreased. For example, if demand has already been reduced by 15% through other measures, during July and August limiting turf watering to two days a week on a region-wide basis would further reduce average daily demand by approximately 15 million gallons. Limiting lawn or turf watering to one day a week will yield an additional average daily reduction of 15 to 20 million gallons. (These figures are based on experience during 1992.)
- Prohibit/ban lawn watering with other watering restricted. For example, no landscape or garden watering between 10:00 a.m. and 7:00 p.m. Newly installed lawns may be exempted from this ban if the procedures listed below are followed. If exemptions are granted, it is with the understanding that if supply conditions deteriorate, before moving to the Emergency Curtailment Stage, lawn watering will be banned and exemptions will be rescinded.

#### EXEMPTIONS FROM WATER USE RESTRICTIONS:

Lawn watering exemption – Newly installed lawns may be exempted from restrictions if the procedures listed below are followed. Customers wishing to use this exemption need to contact BUD as directed in advance of the exemption being granted, and provide their name, address, phone number, size of lawn and type of watering system. This information will be used to quantify the amount of water allowed under this exemption and to spot check for compliance.

The procedures and requirements to obtain a New Lawn Watering Exemption (subject to change) are:

- Upon request, applicant will be provided a packet that includes the New Lawn Watering Exemption requirements and the required application and certification forms for the exemption.
- New lawn owner must apply to BUD for a New Lawn Watering Restriction Exemption. The Exemption Application Form shall be provided by BUD, and the applicant shall include the following information in making application for the exemption:
  - Property owner' name, address and phone number. Name, address and phone number of local contact if different than property owner.

- Address of property the exemption is being requested for.
  - Drawing of the turf area the exemption is being requested for that shows the turf shape and that provides the actual square footage and approximate dimensions of the turf area.
  - Form Certification signed by the property owner certifying that: a) the exemption is being requested for a new lawn as defined below; and b) required signage provided by BUD will be prominently displayed at all times; and c) that the soil was properly prepared as described below; and d) that watering guidelines provided by BUD will be followed; and e) that the City and BUD will be held harmless in the event the exemption is rescinded as discussed below.
- After BUD verifies that applicant meets requirements, an authorization packet will be mailed to the customer, including a sign to be visibly posted indicating that BUD Exemption Requirements are being complied with.
  - New lawns must be properly installed, meaning that at a minimum two inches of organic soil amendment, such as composted yard waste, is cultivated into the top six inches of existing soil.
  - New lawns must be watered according to guidelines provided by BUD in the packet mentioned above.
  - For purposes of this exemption, "new lawn" shall be defined by the Water Utility Code.
  - In the event that supply conditions deteriorate, before moving to the Emergency Curtailment Stage, lawn watering will be banned and exemptions will be rescinded. It will also be revoked on a case by case basis if the exemption requirements are violated by the customer granted the exemption or in the case of a water system emergency. Monitoring and enforcement are at the discretion of BUD.
  - If exemptions are granted, it is with the understanding that the customer will agree to not hold BUD harmless for any and all loss resulting from rescinding of the Restriction Exemption for any reason.
  - The existence of an exemption to a lawn watering ban would be announced as early in the water shortage response process as practical.
  - See Appendix "H" for referenced forms and certifications.
  - Automatic irrigation system exemption – Users of automatic irrigation systems may be exempt from certain mandatory watering restrictions if specific requirements are met and followed – but not from a total watering ban. This exemption allows an alternate path to achieving equivalent water use reductions due to the precision that automatic irrigation systems can achieve. This exemption shall not be used as a loophole to avoid water use curtailment. Example: If only 30 minutes of lawn watering is allowed per week, automatic irrigation systems that meet specified criteria would be allowed to water based on a determined percentage of evapotranspiration (ET), such as 50%, instead of the time-limit based restriction. [Note: ET is a factor calculated according to climatic data, which is commonly used for lawn watering in commercial applications. ET data would be made available on the SPU web page and/or from BUD and in alternate formats.] In the event of a total watering ban, these users would also be prohibited from

watering (unless safety-base exemption is met). The procedures and requirements to obtain an Automatic Irrigation System Exemption (subject to change) are:

- Upon request, applicant will be mailed a packet that includes the exemption requirements and the required application and certification forms for the Automatic Irrigation System exemption.
- Irrigation system owner must apply to BUD for Automatic Irrigation System Exemption. The Exemption Application Form shall be provided by BUD, and the applicant shall include the following in making application for the exemption:
  - Name, address and phone number of the property owner.
  - Address of property exemption is being requested for, and the name, address and phone number of local contact responsible for operation of the irrigation system the exemption is being requested for.
  - Certification that irrigation system has been audited, and is:
    - ✓ Hydro-zoned (separate zones for turf and planter areas).
    - ✓ At least 62.5% efficient as defined by the Irrigation Association, including both system distribution uniformity and management practices.
    - ✓ System efficiency rating must result from an actual audit of the system performed and certified by an Irrigation Association Certified Irrigation System Auditor. The Auditor's name, address and phone number must also be provided.
    - ✓ Equipped with a functioning rain shut-off device.
    - ✓ Audit was conducted within 12 months prior to the request for the exemption.
    - ✓ A list of Irrigation Association certified Irrigation System Auditors will be maintained and available from BUD and/or SPU.
- Certification form to be used shall be provided by BUD.
- A Baseline Irrigation Schedule for the landscape based upon historical ET and hydrozones water needs must be provided to BUD and the local system operator. This schedule will be used to monitor conformance with Exemption Requirements. Schedule form to be used shall be provided by BUD.
- Irrigation system owner and operator must agree to adjust Baseline Irrigation Schedule for the system on a weekly basis according to current ET data. Watering limitations stipulated by BUD would need to be followed. The limitations would be stated as a percent of ET. For example, users who meet the above requirements would be able to water based on 50% of ET (specific percent amount decided at the time the restriction is announced depending on the supply outlook). The SPU website ([www.ci.seattle.wa.us/util/rescons/conserve.htm](http://www.ci.seattle.wa.us/util/rescons/conserve.htm)) and the City of Bellevue's government television station (BTV Channel 55) would be regularly updated to provide the information needed for those watering according to this exemption. The information would be available through other means as well. Time of day restrictions, such as watering between 10:00 a.m. and 7:00 p.m. must be followed.



- In the event that supply conditions deteriorate, before moving to the Emergency Curtailment Stage, lawn watering will be banned and exemptions will be rescinded. It would also be revoked on a case by case basis if the rules stated above are violated by the customer granted the exemption, or in the case of a water system emergency. Monitoring and enforcement are at the discretion of BUD. Customer will agree to hold BUD harmless for any and all loss resulting from rescinding of the Restriction Exemption for any reason.
- Other exemptions – For purposes of dust control, water may be applied to construction areas or other areas needing to comply with air quality requirements. If available and feasible, reclaimed water will be promoted or required for dust control in-lieu of the public water supply.
- Ballfields and playfields may be watered at the minimum rate necessary for dust control and safety purposes.
- BUD will exempt customers with special medical needs, such as home dialysis, from any emergency surcharge, provided individual customers notify the utility of such a need.
- See Appendix "H" for required forms and certifications.

## 5. EMERGENCY CURTAILMENT STAGE

### OBJECTIVES:

Achieve immediate and significant demand reduction goals to maintain adequate water supply essential for basic public health and safety.

### TRIGGERS:

SPU and/or BUD recognize that:

- A critical regional and/or local water supply emergency exists.
- Immediate and significant curtailment actions are necessary to maintain essential supplies of water for public health and safety.

### PUBLIC MESSAGE:

To be determined based upon conditions of the emergency. Basic elements of message are: "A water supply emergency exists. Severe restrictions on water use are necessary to maintain adequate water supply essential for basic public health and safety. The public's continued cooperation is requested. Restrictions will be strenuously enforced."

### EMERGENCY CURTAILMENT STAGE ACTIONS:

No prior emergency in the SPU regional water system or BUD local water system history fits this description. This stage is characterized by two basic approaches. First, stringent and potentially severe water use restrictions are established and enforced. Secondly, significant rate surcharges are used to encourage customer compliance. While a rate surcharge may be implemented in either the Voluntary or Mandatory stages, a surcharge is a key component to the success of this stage, and previous surcharges may be increased if appropriate.

**SPU & SPUSAG COMMUNICATION ACTIONS:**

- Continue all previous, applicable actions.
- Prepares appropriate legislation and recommends Declaration of Emergency to Seattle Mayor and City Council for consideration and approval.
- Informs Purveyors of move into Emergency Curtailment, and of determined water use restrictions, prohibitions, rationing allotments, and/or further surcharges.

**BUD COMMUNICATION ACTIONS:**

- Continue all previous, applicable actions.
- Brief Mayor and City Council; Leadership Team, City Emergency Preparedness Manager, and City Public Information Officer; Environmental Services Commission; and, City employees (Appendix B) regarding water shortage status, the move into the Emergency Curtailment Stage, and water restrictions, prohibitions, and surcharges.
- If not done previously, and, if applicable, concurrent with SPU actions, prepare Declaration of Water Shortage Emergency for the City Manager to sign and public notice materials for appropriate local media.
- Prepare Emergency Curtailment Water Use Restrictions, Prohibitions and Surcharge legislation for Council consideration and approval.
- If applicable, coordinate with SPU as appropriate to define the problem to the public as an emergency.
- Inform customers of the rate surcharge and how it will affect them. Provide information on an appeal process.
- Coordinate with Emergency Preparedness Manager for appropriate implementation of the EOB, EOC and City Emergency Response Plan.
- Through EOC, coordinate with Police, Fire and other City departments for assistance in enforcing prohibition of water waste and other response activities as determined.
- Inform customers that taste and odor water quality problems may occur with system-wide reduced water consumption.
- Inform customers about possible pressure reductions and problems this may entail.
- Define and communicate exemptions for medical facilities and other public health situations.

**BUD INTERNAL OPERATING ACTIONS:**

- Continue and/or enhance all appropriate actions listed in prior stages.
- Continue and enhance "Water Watcher" patrols.
- Curtail fire line testing unless it can be shown to be essential to protect the immediate public health and safety.
- Coordinate with SPU to further enhance water quality monitoring actions.

**BUD SUPPLY AND DEMAND MANAGEMENT ACTIONS:**

- Implement water use restrictions and/or prohibitions per SPUSAG and/or BUDWST recommendations and Council approval, including but not limited to:

- All lawn and turf irrigation prohibited. Lawn Watering and Irrigation System Exemptions previously issued are repealed.
- If feasible, make reclaimed water available to tanker trucks for street cleaning, construction projects, landscape irrigation, dust control, etc.
- Require that all firefighting agencies discontinue the use of water in training exercises until emergency is over.
- Rescind all Hydrant Use Permits.
- Require local parks departments to close down any outdoor pools.

## SECTION 4 (SHORT TERM EMERGENCY CURTAILMENT PLAN)

### INTRODUCTION

Many of the demand reduction measures employed in response to a Short Term Emergency are the same used during a progressive, weather-related shortage. However, short term emergencies are unique because of a lack of preparation time and the urgency of immediate, large-scale demand reductions. Each emergency scenario is different, but most would require major curtailment actions by customers. Further, unlike drought induced water shortages, some emergencies can be localized, requiring demand reduction for only a limited geographic area.

Strategies for dealing with emergencies have been developed based on lessons learned from previous water utility events, other utility experiences and a sorting of measures based on specific criteria. In order to provide a frame of reference for future emergency situations, a short discussion of recent water supply emergencies is provided.

### BACKGROUND AND EXPERIENCE WITH EMERGENCY DEMAND REDUCTION

Between 1987 and 1990, the SPU regional water system experienced two pipeline failures and a major flood that caused short term water emergencies throughout the service area. In 1987 and 1988, different sections of the Tolt Pipeline broke, causing water shortages. In November 1990, torrential rains saturated much of Western Washington, causing flooding of the Cedar River and the closure of a primary water diversion facility and a water treatment plant. The supply of acceptable quality water was limited and stored water supplies were quickly depleted. These past experiences provide good examples of what can be expected during emergency water shortage situations.

**1987 Tolt Pipeline Break:** In November 1987, a section of the Tolt Pipeline in the Woodinville area experienced a major break near a joint in the 5.5 foot diameter supply pipeline. The pipeline break flooded a neighborhood near Woodinville, damaging several homes and temporarily leaving many residents without water. Approximately six million gallons of water were lost from the transmission line that runs between the Tolt River Regulating Basin and SPU's north end distribution system. At the time of the pipeline break, there was an estimated two-

day supply of water for the 10,000 homes affected. Water distribution was then switched over to the Cedar River system to make up for lost supply. Although some customers were initially out of water for a short period of time, the combined effort of SPU's Water Supply and Operations staff and the Woodinville Water District helped restore water service and assure reliable water service during the repair period. During the event, customers were urged to cut back on water use until the repairs were complete. The public responded to the emergency conservation message by reducing consumption by 5% from 134 mgd to 128 mgd while the line was being repaired.

**1988 Tolt Pipeline Break:** In August 1988, another major break in the Tolt pipeline system occurred. This break occurred during the maintenance of a valve which closed too quickly, creating a high pressure surge that broke the supply pipeline. During the emergency event, approximately 100 customer were threatened with loss of water service or experienced low water pressure. Water was immediately diverted from the Cedar system to serve the Eastside customers.

The break occurred in August, during the peak water use season. Immediate action was taken to alert customers that water use reductions were required to avoid additional water shortages. Through the media, customers were asked to curtail all nonessential water uses. The goal was to reduce water use by approximately 30 percent; however, only an 18 percent reduction was achieved.

**1990 Cedar River Flood:** In November 1990, heavy rains flooded many Western Washington rivers including Cedar River. Flooding exceeded the 100 year event and set new historic highs for precipitation. The Cedar River flooded, washing out huge amounts of soil and trees, resulting in a buildup of debris that threatened SPU's Landsburg diversion. The flooding, rain and wind raised turbidity levels at both the Tolt and Morse Lake reservoirs and at the Landsburg diversion to unacceptable levels. At one point, the turbidity on the Cedar River, which provides 70 percent of SPU's regional water supply, was 25 times higher than normal. The short-term water quality situation was determined to be fairly stable, but long-term supplies were in question. Critical storage-regulating facilities, such as Lake Youngs, were at or below minimum operating level. The high turbidity levels in drinking water supplies could not be filtered, as SPU had no filtration system and treatment was limited to chlorination, fluoridation and corrosion control (since this event full filtration and advance treatment has been built and added on the South Fork Tolt River Supply, and advance treatment is under construction on the Cedar River Supply). After a week of restricted water supplies, water consumption decreased approximately 10 percent, or 13 mgd, due to public requests for emergency demand reductions. Throughout the three water shortage events, consistent conservation messages and information on appropriate demand reduction measures were delivered to water users through the media and by direct contact. Although demand reduction goals were not always met by water users, water use was curtailed enough in each instance to suffice and avoid more serious water supply shortages.

There are several criteria by which to decide which demand management measures are appropriate to initially reduce demand during an emergency:



## Appendices

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- Timing: can the measure(s) or action(s) deliver the necessary savings in the necessary timeframe, e.g. are immediate savings needed or can the system support a gradual reduction in demand?
- Magnitude of savings: can the measure(s) or action(s) produce enough savings to make a meaningful difference, e.g. reduce demand to the level the impaired water system can handle?
- Season: can the measure(s) or action(s) make any impact at the time of year that the emergency occurs, e.g. will banning lawn watering have little impact in November?
- Costs: How severe are the cost implications of the measure(s) or action(s) to the customer, including local business and industry.

### SUPPLY AND DEMAND MANAGEMENT DURING EMERGENCIES:

No single strategy can be created which will meet the needs of the department for all emergency scenarios. The criteria listed above create a framework for decision making. Emergencies initially require quick and immediate response. Once an assessment is made as to how long it will take to restore the system, the immediate response strategy may change if it appears that the repair process will be lengthy.

The strategy for most emergencies is to focus on measures and actions that will have the most immediate and significant impact to reduce water use. In the event of a regional Short-Term Emergency all needed and available back up supplies would be activated by SPU and BUD: interties, well-fields, off-loading wholesale customers who have other sources, etc.

Appendix "G" presents a range of potential demand management savings. The range depends on factors including the season, weather conditions, how effectively and urgently the message is communicated, whether or not an emergency surcharge is included, etc.

### SPU & SPUSAG ACTIONS:

See Phased Curtailment, Emergency Curtailment Stage.

### BUD COMMUNICATION ACTIONS:

See Phased Curtailment, Emergency Curtailment Stage.

### BUD INTERNAL OPERATION ACTIONS:

See Phased Curtailment, Emergency Curtailment Stage.

### BUD SUPPLY AND DEMAND MANAGEMENT ACTIONS:

See Phased Curtailment, Emergency Curtailment Stage.

## Appendices

### Appendix – A

#### Water Shortage Response Teams

##### 1. Bellevue Utilities Department – Water Shortage Team

- BUD Management Team
  - Director & Deputy Director
  - Assistant Directors
  - Resource Conservation & DWQ Programs Manager
  - Sr. Resource Conservation Program Administrator
  - Department Public Information Officer
2. Seattle Public Utilities – Shortage Advisory Group • SPU Director
    - SPU Director of Strategic Services
    - SPU Director of Engineering
    - SPU Director of Water Quality & Supply
    - SPU Water Resources Manager
    - SPU Water Conservation Manager
    - Purveyors' Representative and Alternate

## **Appendix – B**

### Internal Communication Groups

1. Mayor & City Council
2. Environmental Services Commission
3. Leadership Team & City Management
  - City Manager and Deputy City Manager
  - Department Directors and Deputy Directors
  - Emergency Preparedness Manager (liaison to EOC/EOB)
  - City Public Information Officer
4. City Employees
5. BUD and City Administrative Assistants – Phone Coverage Staff
6. Neighborhood Liaisons

## **Appendix – C**

### Large Customers & Customer Groups

1. Wholesale Customer
2. Large Irrigators
3. Large Commercial and Industrial Customers
4. Hotels and Restaurants
5. Local Nurseries
6. Private Fountain Owners
7. Bellevue Chamber of Commerce
8. Bellevue Downtown Association
9. Bellevue School District
10. Bellevue Community College

## **Appendix – D**

### Seattle Public Utilities Wholesale Purveyors

### Appendix – E

#### Voluntary Stage Measures

##### 1. Residential Indoors

- Flush the toilet less often. Each flush uses 1.6 to 7 gallons of water depending on age of toilet.
- Use dish and clothes washing machines only when full. Top loading washers use 15 to 40 gallons per load. Front loading washing machines use approximately 30% less water than residential top loading models.
- Keep drinking water cold in the refrigerator rather than running the faucet until the water's cold.
- Take shorter showers; for every minute of reduced showering time, 2 1/2 to 5 gallons is saved.
- Don't let the faucet run while shaving, brushing teeth; when washing vegetables, use a pan or bowl of water instead of letting water run.
- Catch water while waiting for hot water for use on plants.

##### 2. Residential Outdoor Use

- Wash cars less often; instead of using the hose, consider a commercial car wash that recycles water.
- Always use shut-off nozzle on hoses for window washing, etc.

##### 3. Landscape Measures - Commercial and Residential

- Water lawns and gardens only early in the morning or late in the evening to reduce evaporation.
- Consider letting established lawns go dormant until the shortage is over. Homes that normally water lawns will save from 25% to 50% by not watering lawns.
- If it is raining don't water lawns.
- Eliminate outdoor water play, i.e., running through the sprinkler, plastic water slides, wading/swimming pools that require frequent re-filling.
- Eliminate all hosing of sidewalks, driveways, decks.
- Water established plants only when necessary: Probe into the soil to see if the root zone is dry. Mulch—from two to four inches—in planting beds will help retain moisture.
- Create "wells" around trees to minimize runoff when they are watered.
- If there is an automatic irrigation system, have it audited to ensure that it is using water efficiently. Learn how to change the program that controls the system in order to cut back on irrigation time. Equip it with a rain sensor that will override the system during rainfall.

##### 4. Commercial

- Set goals for reduced water use and inform employees. Give employees ideas for curtailing water use and ask them for theirs.
- Repair all leaks and dripping faucets. Urge employees to report leaks.

- Reduce or eliminate routine vehicle cleaning during shortage. Use local commercial car wash facility that recycles water.
- Ensure that all hoses are fitted with shut-off nozzles.
- Eliminate hosing used ice as a means to dispose of it.
- Eliminate all hosing of walkways, parking lots, loading docks. Pressure washers use substantially less water.
- Postpone routine building washing until after shortage.
- Post signs informing customers of the nature of the water shortage and ask for cooperation in reducing water use.
- Turn off all non-recirculating fountains. On windy days, where there is significant water loss, turn off all fountains.
- Restaurants: provide water only on request.
- Accelerate the update of restrooms by replacing older toilets with 1.6 gallon per flush models.
- Parks: limit wading pool hours to days that are forecasted to be 70 degrees or warmer (wading pools are generally emptied and refilled daily for public health reasons).

## **Appendix – F**

### **Mandatory Stage Enforcement Procedures**

- Determine number of warnings before fines applied.
- Self-duplicating "Notice of Violation" forms printed; one copy to leave at property, one to record violation with BUD.
- Staff with customer service and communication experience assigned to "Water Watch."
- Establish procedure for "Water Watchers" to record warnings and penalties on customer accounts.
- Establish "hotline" for customers to complain about violations; to help avoid frivolous complaints, recorded message should note that only complaints with name and address recorded can be responded to.
- Vehicles for "Water Watch" made available; vehicles that are signed as "Water Watchers" will increase visibility and effectiveness of enforcement.
- High priority routes established, e.g., areas with large lawns.
- All field and customer service staff provided "fact sheets", Question and Answer sheets; briefed on restrictions, enforcement procedures; field staff trained on tagging obvious violations.

## **Appendix – G**

### **Curtailment Measures Potential Demand Reductions**

## **Appendix – H**

### **Exemption Forms**



## Appendices

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- New Lawn Watering Exemption Application forms and certifications.
- Automatic Irrigation System Exemption Application forms, certifications, and schedules.
- Other Exemptions.



# Parks & Community Services Department

## Water Shortage Response Plan

The Bellevue Parks & Community Services Department, in cooperation with the Bellevue Utilities Department, has adopted an aggressive, pro-active response plan to meet the demands of regional water shortages when they occur. This plan was first developed and put into place during a regional water shortage in 2001. The Parks Water Shortage Response Plan not only meets all conservation targets, but serves as an example to the community for others to follow. We encourage others to adopt similar procedures and conservation measures as they may apply. Together we can minimize impacts to our landscapes, and our lives, during challenging water shortage times.

This water shortage response plan serves as a response to the Voluntary Stage of phased curtailment of water consumption. It reduces normal irrigation use by 50%. It allows us to protect our investment in expensive trees and shrubs, and the many benefits they provide, while dramatically reducing irrigation to turf areas.

This plan meets water conservation goals while still allowing select green spaces for the public to enjoy. It has built-in flexibility to ramp back irrigation consumption should a water crisis escalate or resume typical managed irrigation should regional supplies allow. The Parks & Community Services Department will work closely with our Utilities Department to monitor regional water supplies and respond to any changes that occur.

### BACKGROUND FACTS:

- The City has had an active Water Conservation Program in place for over 20 years. It is an integral facet of our planning processes and our Renovation and Refurbishment Plan. Focus areas include:
  - Landscape planning and design
  - Implementation of effective cultural practices during installations
  - Modern irrigation system construction, replacement and management
  - Landscape management and maintenance practices
  - Water conservation measures applied in all buildings
- The Bellevue Parks & Community Services Department manages over 2,900 acres of public property of which 921 acres consists of City-owned trees, landscaping and vegetation at community parks, neighborhood parks, waterfront parks, sports fields, streetscapes and civic facilities.
- The Resource Management, Natural Resources and Golf Course Divisions manage over 225 irrigation controllers that supply water to over 2,250 irrigation zones throughout the City.

- Over 2/3 of the City's parklands are native forests and wetlands.

### **BELLEVUE PARKS WATER SHORTAGE RESPONSE PLAN:**

The Parks & Community Services Department will implement this plan whenever the Voluntary Stage of the Utilities Water Shortage Response Plan is initiated as a result of a state-wide or regional drought emergency. Accordingly, the Parks & Community Services Department will manage the City's park resource system according to the following guidelines until such time that the Utilities Department determines that water supplies are adequate to resume additional parks irrigation. This plan is designed to provide flexibility to ramp parks irrigation up or down as drought conditions become more or less severe.

#### **VOLUNTARY STAGE:**

- Irrigation systems will be activated and tested to ensure that systems are functioning correctly and that there are no breaks in underground lines that waste water. This is an ongoing practice that is worked into the Park Department's standard operation maintenance, but will be emphasized during periods of drought emergencies. We encourage businesses and homeowners to do the same. Pipe joints can become weakened with time, and geologic activities, such as earthquakes, may contribute to possible line failures.
- Irrigation systems will initially be scheduled to eliminate irrigation to turf areas on streetscapes, utility sites and City parks except as described below. It is anticipated that these measures would reduce system wide water use by up to 50%. These measures would remain in effect until such time that an improved water supply forecast is available.
- In general, irrigation for turf areas will be eliminated. The following exceptions will apply to specific park sites so to minimize the impact to the public:
  1. Reduced irrigation (90% of ET) at:
    - Inner circle of Downtown Park
    - Newcastle Beach, Enatai Beach, Clyde Beach, Chism Beach and Meydenbauer Beach Parks
    - Robinswood Park – Lawn between house and pond, Cabana lawn
    - Crossroads Park – International Section
    - Athletic fields
  2. Should it be necessary to setup conservation efforts, we would further reduce irrigation by an appropriate percentage of ET in balance with supply forecasts.
  3. Golf courses – irrigate greens and tees; reduced irrigation (90% of ET) on fairways throughout season.
- Shrubs and trees will be irrigated by hand or with very efficient irrigation systems such as drip, bubbler, or computer controlled systems designed to separate turf areas from tree

and shrub zones. Our goal is to keep plant material alive to protect the public's investment. Should it be necessary to step up conservation measures, we would next eliminate shrubbery irrigation (with the exception of the collections at the Bellevue Botanical Garden), then tree irrigation with the exception of survival watering manually or through appropriately zoned irrigation systems.

- Downtown Park water features: (All systems are recirculating)
  - Belvedere Fountain may be turned off.
  - Canal may remain operating and would remain running in order to maintain water quality.
  - Waterfall operation may be reduced. It may run from 11 am to 1 pm and from 6 pm to 8pm.
- The Bellevue Botanical Garden water features may operate daily, only from 8 am to 4 pm, should the water supply forecast indicate that a lawn watering ban will not be implemented.
- New ornamental and CIP landscape installations would be delayed until the fall.

## **MANDATORY STAGE:**

- At such time that mandatory lawn watering restrictions are implemented, all above measures shall be continued. Additionally, lawn irrigation at exempted parks will be further reduced on an incremental basis dependent upon the severity of the water shortage and demand reduction needed, as determined by the Utilities and Parks & Community Services Departments. Further restrictions on water features will also be considered at such times that mandatory lawn watering restrictions are implemented.
- Consistent with actions taken during the water shortage in 1992, in the event that a full mandatory ban on lawn watering is implemented, all park lawn watering will be stopped, except for the following sites which will be deficit watered to provide some green public areas within the community: Downtown Park Center Circle; Robinswood Cabana area lawn; Newcastle Beach Park; Bellevue Botanical Garden plant collections; athletic field activity areas; newly seeded turf areas.

## **EMERGENCY CURTAILMENT STAGE:**

- In the event that the Emergency Curtailment State of the Utilities Water Shortage Response Plan is implemented, all watering of City parks and facilities by use of domestic water supplies will be stopped.

## **CONTACTS:**

- Parks Department Response: Call Resource Management at 425-452-6855
- Utilities Department Response: Call Water Conservation at 425-452-4127